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THE UNIVERSITY OF ALBERTA

THE INFLUENCE OF FAMILY ENVIRONMENT ON DIABETIC ADJUSTMENT AND METABOLIC CONTROL IN DIABETIC ADOLESCENTS

BY

BARBARA MAHAFFEY

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF

MASTER OF SCIENCE

IN

FAMILY LIFE EDUCATION

DEPARTMENT OF FAMILY STUDIES

EDMONTON, ALBERTA

SPRING, 1990

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FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled: **The Influence of Family Environment on Diabetic Adjustment and Metabolic Control in Diabetic Adolescents**, submitted by Barbara Mahaffey in partial fulfillment of the requirements for the degree of Master of Science in Family Life Education.

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Date: June 16, 1989

DEDICATION

To my wonderful friend and companion,

Richard

whose love and constant support encourage me greatly.

ABSTRACT

Juvenile diabetes mellitus is a chronic illness which has considerable impact on adolescents with diabetes and their families. This study examined the relationship between diabetic adjustment, family environment (as measured by social support and family strengths) and metabolic control. Questionnaire data were collected from 40 family groups including mother, father, and adolescent diabetic. The instruments used were Sullivan's Diabetic Adjustment Scale; Olson, Larsen, and McCubbin's Family Strengths Scale; Cooke, Rossman, McCubbin, and Patterson's Social Support Inventory. Metabolic control was determined by a non-fasting blood test ($HbA1_c$).

There was a positive and statistically significant relationship between one aspect of diabetic adjustment (attitudes to diabetes) and metabolic control. Thus, adolescents who had better attitudes to diabetes had better levels of metabolic control.

The relationship between diabetic adjustment and social support was such that the more support the parents received from their spouse and children, the better the adolescent's diabetic adjustment (attitudes towards diabetes). The most important informal sources of support identified were the family. This substantiated previous research results indicating that adolescents with better levels of diabetic adjustment live in socially supportive family environments.

The relationship between metabolic control and social support was such that increased levels of support to the parents was associated with poorer levels of adolescent metabolic control. Social support was represented by four sources: relatives and friends, groups, religion, media and one kind of support, altruistic support. These results suggest that social support may have been used by the parents as a coping strategy. A new theoretical model is proposed for studying the relationship between diabetic adjustment, family environment and metabolic control.

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CHAPTER 1

Introduction and Statement of the Problem

Chronic illness constitutes one of the major health concerns for children in North America today. Cullinane (1983) reports that 10 to 15% of all children under 18 years of age have some type of chronic condition. It is well known that the presence of a chronic illness has a profound impact on both the individual and the family in that management often requires the involvement of the individual and the family unit.

"Insulin dependent diabetes mellitus is one of the four most prevalent chronic illnesses of childhood and the most common endocrine disorder of childhood" (Wertlieb, Hauser, & Jacobson, 1986, p. 464). Juvenile diabetes, which is treatable but not curable, is one chronic illness which involves the family to a high degree in its management. Family members are often involved in such broad management activities as diet planning, exercise regulation, blood glucose monitoring, and administration of insulin injections. This daily therapeutic regime is complex, demanding, and often not totally successful. In addition, the disease management regime may also affect previously well established family routines such as family eating and activity patterns.

Adjustment to and control of diabetes becomes more difficult at certain developmental stages such as adolescence when accomplishment of the normal tasks of adolescence often set up conditions of eating and activity which complicate metabolic control. Normal adolescent concerns about body image, peer approval and acceptance, and issues relating to dependence/independence are often questioned and challenged by the complex and restrictive practices of the diabetic management routine. For example, friends are able to eat freely but an adolescent with diabetes must eat meals on time and avoid junk food. The desire to sleep in on weekends is prevented by the need to have breakfast and daily insulin injections on time. Thus, there are no holidays from the diabetic routine.

Early research on adolescent diabetic management focused on individual factors and their relation to the achievement of satisfactory levels of metabolic control. Some of these individual factors studied included age, gender, diabetic knowledge, intelligence, birth order, age at onset, and duration of illness. A major portion of this literature also investigated psychosocial or psychological factors such as self-esteem, self-concept and ego development in relation to diabetic adjustment and metabolic control. It seems that much of this research measured a large number of individual factors in an attempt to determine which factors were associated with poor and good metabolic control. While it is difficult to draw firm conclusions regarding this large body of research, the most consistent finding in this research suggested that poor individual, social and emotional adjustment to diabetes was more often associated with poor metabolic control than with good control.

More recently, recognition of the family as a system and its central role in the management of diabetes, has shifted the focus of research to an examination of the broader influence of the family environment on both diabetic adjustment and metabolic control. One family factor, quality of the family environment, was found to be an important predictor of metabolic control (Anderson, Miller, Auslander, & Santiago, 1981) and diabetic adjustment (Hauser, Jacobson, Wertlieb, Brink, & Wentworth, 1985). The former authors found that adolescents in good metabolic control came from cohesive families where there was little conflict. Those parents who encouraged adolescent independence yet were involved and cooperated in the management routine also had adolescents who were in good metabolic control. In contrast, adolescents from over-protective (LaHood, 1970); chaotic families (Orr, Golden, Myers, & Marrero, 1983) and families with high degrees of marital conflict (Koski & Kummento, 1977) had adolescents in poor control. The most consistent finding from studies of various dimensions of the family environment suggested that adolescents who attained

good metabolic control lived in emotionally supportive family environments where there were few interpersonal conflicts.

Based on the above evidence, it is expected that achievement of a good level of physiological metabolic control will be influenced by the quality of family relationships within the family. An open, warm and caring family environment can facilitate a family's adjustment to diabetes. Parents who support each other can, in turn, support and assist the adolescent to comply with the diabetic management routine. It is essential therefore, to examine individual and family factors as they both may have an impact on diabetic adjustment and metabolic control.

Achieving acceptable levels of metabolic control has been the primary goal of diabetic management. This is based on the view that maintaining adequate metabolic control is associated with fewer long term complications of the disease. For this reason, some measure of metabolic control has been the main dependent variable in most of the previously conducted research.

There are many aspects of the family environment which may be critical in facilitating achievement of acceptable levels of metabolic control. This study will focus on two aspects of the family environment, social support and family strengths. In this study, these two variables are considered family resources which allow the family and the individual greater potential in resolving the key issues of managing diabetes. Measures of these two variables provide an index of the social support network as well as the resource base of the family unit. One would expect the presence of these two variables to have an impact on an adolescent's adjustment to and control of diabetes in that they reflect a certain supportive family network. Few empirical studies have examined the role of resources such as social support and family strengths in relation to diabetic adjustment and metabolic control. Such an investigation may shed some light on the difficulties which parents of diabetics experience in managing the diabetic regime (Marteau, Gillespie, & Swift, 1987).

Not only does the adolescent need to be supported in the management routine, but there may be parental needs for support, which if not identified, may add to problems associated with the complex diabetic routine. It may be possible that the amount of support the adolescent receives from their parents may in fact depend on the amount of support the parents receive from others. In addition, a family's system of internal resources such as love, trust, and communication, may facilitate a family's and individual's adjustment to a chronic illness like diabetes.

The responsibilities of diabetic management have been typically assumed by the mother, thus most research has been conducted from only the mother's perspective. This thesis will study both mothers' and fathers' perspectives of the qualities of the family environment and relate them to diabetic adjustment and metabolic control.

Statement of the Problem

The relationships among family environment variables, diabetic adjustment and metabolic control are undoubtedly complex. It is the purpose of this study to examine the relationship of two variables, diabetic adjustment and family environment (as measured by social support and family strengths), to metabolic control of adolescent diabetics. This study is limited to the assessment of mother's and father's perceptions of two specific qualities of the family environment, social support and family strengths.

Thus the statement of the problem is: How are family environment, diabetic adjustment, and metabolic control related? This problem is further subdivided into the following research questions:

1. What is the relationship between diabetic adjustment and metabolic control?

2. What is the perceived quality of the family environment, as measured by two indicators, social support and family strengths, for parents with an adolescent diabetic?

    a. What are the kinds, sources, and amounts of social support for parents with adolescents who have diabetes?

3. What is the relationship between these two family environment indicators and metabolic control?

    a. What is the relationship between social support and metabolic control?

    b. What is the relationship between family strengths and metabolic control?

4. What is the relationship between these two family environment indicators and diabetic adjustment?

    a. What is the relationship between social support and diabetic adjustment?

    b. What is the relationship between family strengths and diabetic adjustment?

5. What effect does social support have on the relationship between diabetic adjustment and metabolic control?

Definition of Terms

The following definitions of terms will be used in this study.

Family Group

A family is considered to consist of a mother, father and an adolescent with diabetes who have lived together for at least one year. This group may or may not be the entire family unit.

Adolescent with Diabetes

An adolescent is an individual between the ages of 13-18 years who has had juvenile diabetes for at least one year prior to the study.

Metabolic Control

This is a term which describes the physiological state of a diabetic individual in which blood glucose levels are maintained which are similar to those of the non-diabetic individual.

Diabetic Adjustment

This is a term which describes how well the adolescent diabetic integrates the demands of diabetes management routines into one's daily lifestyle.

Family Environment

This is a term which describes the social climate within the family group. Social support and family strengths are the two specific indicators of the family environment focused on in this study.

Social Support

Social support is a resource which refers to the amount, source and kind of interactions and exchanges among people (Cooke, Rossman, McCubbin, & Patterson, 1988). This definition includes five kinds of support (emotional, esteem, network, appraisal, and altruistic) as received from 11 different sources (spouse/partner, children, other relatives, close friends, co-workers, church groups, spiritual faith, community groups, professionals, special groups and sources of media such a as TV, books, pamphlets).

1) Emotional support - information which leads you to believe that you are cared for and loved as a person.

2) Esteem support - information which leads you to believe that you are valued and respected for who and what you are and what you can do.

3) Network support - information which leads you to believe that you receive a sense of trust and security from belonging to a group to whom you are also obligated.

4) Appraisal support - information which provides you with feedback about how you are doing and ideas for resolving difficulties.

5) Altruistic support - information which leads you to believe that you are worthwhile because of what you have done with and for others.

Family Strengths

These are considered to be resources or qualities within the family group which contribute to a family's ability to adjust to changing situations. The instrument in this research used to measure family strengths focuses on trust, loyalty, respect and a family's sense of competency (Olson, Larsen, & McCubbin, 1982).

CHAPTER 2

Conceptual Framework

Introduction

Early research studying the management of diabetes focused primarily on the characteristics of the diabetic individual and how these related to metabolic control. The relationship between these variables assumed a linear model. Recently, a recognition of the tremendous influence of the family and qualities of the family environment on diabetic management has compounded conceptualization of the complex relationships between individual variables, family variables and metabolic control. No one conceptualization of the relationship between individual diabetic adjustment, family environment and metabolic control has succeeded in describing this complex relationship. The conceptual framework developed for this research is based upon a developmental and systemic approach to the understanding of the complex nature of the relationship among these variables.

The Conceptual Model

Figure 1 is a diagram of the conceptual model and the variables that are of importance in this study. These variables are diabetic adjustment, family environment, and metabolic control. Arrows between the variables do not presume direction, only that an association between them is possible.

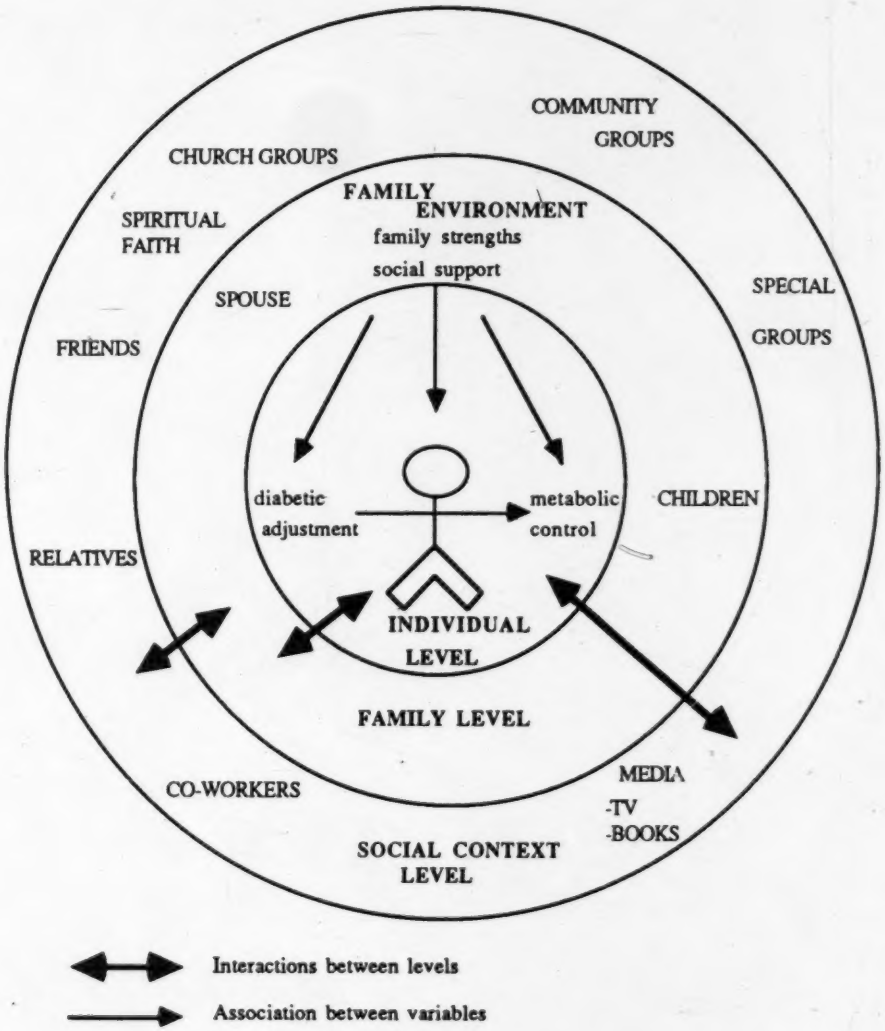


FIGURE 1 THE CONCEPTUAL MODEL

Assumptions of the Model

There are eight key assumptions of the conceptual model: (1) adolescent diabetes occurs within a family context, thus both individual and family factors need to be considered; (2) every individual with diabetes lives within a social context, and this social environment can have significant effects on the individual's adjustment to and control of diabetes; (3) diabetes is a complicated chronic disease which involves demanding and time consuming therapeutic regimes that affect and consequently involve all family members; therefore the relationship between adolescent diabetics and their families is complex; (4) the relationship between individual, family and social factors is interactive, that is, influences move in both directions; (5) the family group, who demonstrate active interactions among their members, provide the environment in which physical, social, emotional, psychological and spiritual growth can be obtained; therefore it is the qualities of this environment that can influence both diabetic adjustment and metabolic control; (6) adjustment to a chronic illness like diabetes is a dynamic process requiring continual adjustment and re-adjustment; (7) the family group must continually adapt and adjust to outside influences; (8) developmental factors of the individual provides a context to facilitate the understanding of this complex relationship.

Description of the Model

The following description will demonstrate how the model helps explain the proposed relationships between the variables of interest in this study. In attempting to understand the relationship between diabetic adjustment and metabolic control, it seems important to examine the influence of social support and family strengths, two important psychosocial indicators of the family environment.

The conceptual model presented in Figure 1 shows three concentric circles surrounding the individual diabetic adolescent. The first, or inner most circle,

represents specific characteristics of the individual that may influence individual adjustment to diabetes. It is assumed that an individual's adjustment to diabetes will be reflected in the achieved level of metabolic control. In this study the individual is an adolescent with insulin dependent diabetes.

Adolescence is considered to be a key transitional period in an individual's growth and development in which a number of developmental tasks must be accomplished. Achieving these tasks can be compounded by the manifestations of diabetes thus making adjustment to and control of diabetes more difficult. At the individual level, there are several physiological variables and psychological characteristics that are important contributors to an individual's diabetic adjustment and metabolic control. Although the many correlational studies do not not allow for a causal interpretation, the data suggests that, overall, better diabetic adjustment is associated with better levels of metabolic control.

The second circle depicts the reciprocal influence of the adolescent diabetic, and the family on one another. Diabetes is not only an individual disease but also a "family disease" in that it affects and involves the entire family in its management. The family environment in this study is a term which describes the social climate within the family group. The two indicators of the family environment focused upon in this study, social support and family strengths, are considered to be resources available to the parents. Thus, social support and family strengths as perceived by the parents, are assumed to have a beneficial effect on diabetic adjustment and metabolic control. Effective management of diabetes requires supportive relationships that promote an atmosphere of open discussion among the family members about issues relating to diabetes.

Family strengths such as trust, respect and a family's ability to handle changing situations are qualities inherent within the family group. It is believed that these resources assist the parents in feeling confident about co-operating with the adolescent diabetic in the management routine.

The third concentric circle is composed of people and other sources of support in the broader social environment available to the family (e.g. community, church, and other groups). Past research has suggested that the quality of parent-child interaction may be related to the support provided by the parent's social environment (Cochran & Brassard, 1979). Parents of adolescent diabetics may seek various kinds of support (e.g. emotional, esteem) from various sources for managing the adolescent diabetic and the complex routine associated with the disease.

Moving from the innermost to outermost circle, one can see that each concentric circle or each level can influence and is influenced by the other circles in the model. Thus, all influences are bidirectional, moving in both directions from the adolescent diabetic to the family and social environment just as the family and social environment have a major impact on the diabetic adolescent.

Summary

The conceptual model presented in Figure 1 illustrates the complex nature of the influences of the family and social environment which can affect an individual's adjustment to and control of diabetes. Although the model shows each each of the three levels as separate and distinct, they interact extensively. Thus, each level can influence and is influenced by the other two levels.

There is evidence that adjustment and control of diabetes can be influenced by individual, family and social variables. The focus of the study is the relationship of two family environment variables on diabetic adjustment and metabolic control in diabetic adolescents. It is assumed that an individual's adjustment to diabetes will be reflected in the adolescent's achieved level of metabolic control. Two aspects of the family environment (social support and family strengths) as perceived by the parents, are assumed to have a beneficial effect on both diabetic adjustment and metabolic control. Further, it is possible that social support of the parents may have an effect on

the relationship between diabetic adjustment and metabolic control. Thus, it is believed that an individual's diabetic adjustment and metabolic control will reflect the impact and possible interaction of qualities of the family environment (social support and family strengths).

CHAPTER 3

Review of Related Research

Introduction

The purpose of this chapter is to review and develop the concepts presented in the previous two chapters. The first part will review the influence of diabetes on developmental tasks of adolescence, followed by a section on the importance of metabolic control. The next section will examine the relationship between diabetic adjustment and metabolic control. The last section will review the influence of the family environment on diabetic adjustment and metabolic control.

Influence of Diabetes on Developmental Tasks of Adolescence

Adolescence, a key transitional period in the developmental cycle, is often a difficult and stressful time in which the adolescent must accomplish certain developmental tasks. Various theorists have outlined the developmental tasks of adolescence. According to Erickson (1963) the main task of adolescence is the search for one's identity. Havighurst (1951) and Weiner (1976) suggested that adolescents needed to achieve emotional independence from their parents and other significant adults, adjust and accept physical and sexual maturation, enter into responsible, heterosexual social relationships and begin to prepare for marriage and the future. Successful achievement of these developmental tasks result in an adolescent with a unique identity and personality, adequate self-esteem, positive body image, emotional independence, a sexual identity, and a realistic perception of the future.

The impact of diabetes on the achievement of adolescent developmental tasks is apparent throughout the three chronological stages of adolescence. Early adolescents (11-13), in search of their identity, are particularly self-conscious and primarily concerned about the rapid physical changes occuring within their bodies, thus affecting their body image. These bodily changes of puberty can pose a threat to one's self

identity (Hamp, 1984). At this time, poorly controlled diabetes may lead to slower growth or delayed sexual maturation (Drexler, 1982; Laron, Volovitz, & Karp, 1977), thus complicating the resolution of identity issues.

The key developmental task for mid-adolescents (14-16) is achieving emotional independence from one's parents and other adults (Havighurst, 1972). During this stage, it is certain that diabetes increases the number of normal dependence/independence issues between adolescents and parents. Adolescents want and need independence, yet achievement of good metabolic control requires increased involvement and supervision by the parents. This may lead to overly protective and concerned parents and create additional conflicts about diabetes. Along with this desired major shift away from the influence of the family, is the need to conform and be accepted by the peer group. Much of the adolescent lifestyle at this time focuses on fad eating and consumption of junk food, none of which is allowed on a diabetic diet. Such constraints continue to be reminders of one's state of abnormal health and being different (Travis, 1975).

The major task of late adolescence (17-20) is achieving responsibility for one's self with a focus on future oriented issues such as education, career and marriage (Hofmann, 1975). For the first time, it is now possible that for those adolescents who have had diabetes since childhood, complications may be noticed. In turn, adolescents may feel they have lost control and mastery of their bodies (Greydanus & Hofmann, 1979). A realization of the implications of having diabetes may interfere with choices of a career. For example, diabetics may be exempted from some occupations such as pilot and fireman (Crockford, Gupta, Melenka, & Brown, 1980).

Every family with a diabetic adolescent must deal not only with the normal developmental tasks of adolescence, but are also challenged to meet the special needs in relation to diabetes. The need for compliance with the medical treatment such as daily blood glucose monitoring, insulin injections and diet regulation, when combined with

the struggle for independence, and acceptance by peers, may create conflicts for the adolescent as well as his/her family. An understanding of how diabetes influences the normal developmental tasks of adolescence provides support for the argument that how well the adolescent achieves these tasks and accepts these challenges, may well affect an adolescent's adjustment and subsequent control of diabetes.

Importance of Metabolic Control

There are both short (acute) and long term complications as a result of having diabetes. Most adolescent diabetics manage their diet, exercise, and insulin well enough in order to avoid short term side effects such as hyper and/or hypoglycemia (West, 1978). In addition, there are long term complications involving vascular damage to the eyes, kidneys and peripheral arteries which increase the risk of kidney and heart disease, blindness and infections leading to gangrene. These usually appear anywhere from 10 to 20 years after initial diagnosis (Johnson & Rosenbloom, 1982; Leslie & Sperling, 1986).

The goal of diabetic management is to "ensure a normal lifespan, free from the late complications of the disease while maintaining an acceptable quality of life" (Pless, Heller, Belmonte, & Zvagulis, 1988, p. 387). Achievement of this goal requires thoughtful consideration of the control of blood glucose levels. Metabolic control as defined earlier, refers to the physiological state in which blood glucose levels are maintained which are similar to those of the non-diabetic state. How well this can be achieved has been and continues to be debated in the literature.

In the past, this controversy centred around the relationship between strict or tight versus loose control and the presence of long term complications. Some physicians believed that strict management resulted in better control and prevented or delayed long term complications while others emphasized loose control so as not to disrupt an individual's social development, thus improving one's quality of life (Rosenbloom &

Giordano, 1977). There is still no firm conclusion regarding this controversy. While it has been suggested that achieving normal or good levels of metabolic control should be the goal of diabetic management (Travis, Brouhard, & Schreiner, 1987), the question remains how good is good and at what cost to the individual? More recently, a review of retrospective and prospective studies in humans suggested a direct correlation between the degree of metabolic control and the appearance and severity of long term complications (Leslie & Sperling, 1986). Patients in poor metabolic control consistently had a higher prevalence of long term complications. This parallels the findings of Bloom, 1967; Brownlee and Cerami,1981; Danowski, Ohlsen, Fisher, and Sunder, 1980; Drash, 1976; and Pirart, 1978 which lend support to the argument that disturbances in metabolic control are linked to the presence of vascular complications. Additionally, there may be other genetic and unidentified factors that influence the appearance of these complications (Leslie & Sperling, 1986).

In view of the growing evidence linking complications to the degree of metabolic control, it has been given high priority in management plans. Metabolic control is often difficult to control despite careful attention and adherence to the management routine (Cox, Gonder-Frederick, Pohl, & Pennebaker,1986; Daneman et al. 1982). In addition, there are many other factors which negatively affect control during adolescence. The physical and hormonal changes that accompany puberty, increases in weight, and emotional upsets are factors which interfere with an optimal level of metabolic control (Bruhn, 1977; Meldman, 1987; Travis et al. 1987). In addition, the social aspects of the adolescent lifestyle are not compatible with good metabolic control. Physiological factors such as colds, infections, and physical illness can also cause alterations in blood sugar levels (Danowski, Ohlsen, Fisher, & Sunder, 1980; Watts, 1980). Emotional stress has also been found to be directly associated with poor metabolic control (Barglow, Edidin, Budlong-Springer, Berndt, Phillips, & Dubow, 1983; Barglow, Hatcher, Edidin, & Sloan-Rossiter, 1984).

In summary, although inconclusive, the literature suggests that achievement of near normal or good levels of metabolic control is advisable in order to prevent long term complications associated with diabetes. Other research shows that metabolic control is adversely affected by other factors which may also contribute to the development of long term complicatons. Management of diabetes and maintaining good levels of blood glucose should be maintained keeping in mind the emotional and psychological well being of the adolescent and his/her family.

Diabetic Adjustment and Metabolic Control

Historically, early research on diabetes concentrated on the search for various personality traits which were presumed to predispose an individual to the development of diabetes. A large body of research resulted, in which few personality characteristics were consistently associated with a diabetic personality (Dunn & Turtle, 1981; Johnson, 1980). Later, researchers began to ask "what individual psychosocial factors contribute to the adjustment and control of diabetes?" Adjustment to diabetes was based on a large number of broad descriptors. The primary focus of this research was to identify these broad descriptors and how they might be associated with good versus poor metabolic control in diabetic adolescents.

Much of this research, of which there were various themes, was conducted by psychiatrists, endocrinologists and psychologists. These themes included illness related variables, demographic variables and family structural variables which have all been studied in relation to metabolic control. Illness related variables included age at onset (Swift, Seidman, & Stein, 1967; Williams, Martin, Hogan, Watkins, & Ellis, 1967) and duration of illness (Ludvigsson, 1977; Sullivan, 1979 b). Demographic variables comprised factors such as age (Etzwiler & Sines, 1962), gender (Etzwiler & Sines, 1962; Simonds, Goldstein, Walker, & Rawlings, 1981), and socio-economic status (Bennett & Johannsen, 1954; Chazan, MacLaren, Shetty, Tooley, & Wilkinson,

1982; Swift et al. 1967). Family structural variables included variables such as birth order (Koski, 1969; Swift et al. 1967; Tietz & Vidmar, 1972); and number of siblings (Williams et al. 1967). Because these variables are not the primary focus of this study, the findings will not be reviewed here but may be found in reviews by Johnson (1980), and by Hanson and Henggeler (1984).

Diabetic adjustment in this study refers to how well an adolescent diabetic integrates the demands of diabetes into one's daily lifestyle. Attendance and participation in school activities are key elements in the daily lives of diabetic adolescents. School adjustment has been studied by several researchers. Sterky (1963), Swift et al. (1967), Weil and Ack (1964) all reported no differences in school achievement between a diabetic and non-diabetic group. In contrast, Etzwiler and Sines (1962); Fallstrom (1974); Koski (1969); reported that diabetic children had academic difficulties (for example deficiencies in reading) in school. While it is possible that these difficulties in school may be associated with intelligence, several researchers (Koski, 1969; Kubany, Danowski, & Moses, 1956; Steinhausen, Borner, & Koepp, 1977) have reported diabetics to be of average intelligence.

Many studies have associated diabetes control in adolescence with personal and social adjustment to diabetes. Adjustment in this case refers to positive perceptions of self-esteem, body image and psychological health. Kaufman and Hersher (1971) in a small sample of diabetic adolescents, reported seriously damaged body images. These healthy looking adolescents described their internal body as incomplete, distorted or diseased. Sullivan (1979 b) also found body image concerns and lower self-esteem in adolescent girls at a diabetic camp. Other researchers (Anderson et al. 1981; Simonds, Goldstein, Walker, & Rawlings, 1981) found high self-esteem to be associated with good metabolic control.

Some researchers (Koski, 1969; Simonds,1977 a; Swift et al. 1967) contended that the incidence of emotional and behavioral problems was higher in persons with

diabetes than in those without the disease. Although all of these researchers found minimal psychological disturbances in their samples, they noted that those who had adjustment problems occurred more frequently among those who were in poor control. For example, Simonds (1977 b) found that poorly controlled diabetics displayed behavior problems and independence/dependence conflicts. In contrast, Swift and Seidman (1964) reported that diabetics who had better psychosocial adjustment had better metabolic control.

The attitudes that an individual develops toward one's self and one's diabetes are also important. Partridge, Garner, Thompson, and Cherry, (1972) reported that a majority of adolescents had healthy attitudes toward their illness. Sullivan (1979 b) also noted that positive attitudes toward diabetes correlated with other factors such as relationships with peers and family, and school adjustment. Ludvigsson (1977) found that knowledge about diabetes combined with positive attitudes were associated with adequate diabetic management.

In summary, it is apparent that researchers have measured a large number of factors to determine which ones were associated with good and poor metabolic control. While no firm conclusions can be reached, the main finding is that an individual's poor social and emotional adjustment to diabetes is more often associated with poor metabolic control. Those who adjust well to diabetes are more likely to achieve good metabolic control, whereas those who don't adjust well are in poorer metabolic control. These studies provide some support for the argument that various aspects of one's adjustment to diabetes may be important for later attainment of good levels of metabolic control.

Influence of Family Environment on Diabetic Adjustment and Metabolic Control

Several dimensions of the family environment, although conceptualized differently, have been found to be consistently associated with metabolic control and diabetic adjustment. Recent studies examined various family member's perceptions of family

environment and how this relates to metabolic control. For example Anderson et al. (1981) obtained parent's and adolescent's perceptions of the home environment and the family's involvement in the management of diabetes. Parental (mother's) perceptions of various aspects of home environment (as measured by Moos Family Environment Scale) were related to the adolescent level of metabolic control ($HbA1_c$). Parents of well controlled diabetics encouraged the adolescent diabetic to be more independent and to express their feelings openly. Adolescents who were in good metabolic control described their family environment as helpful, supportive and lower in conflict.

Other researchers (Hauser et al. 1985) studied adolescent and parental perceptions of family environment and their relationship to diabetic adjustment using Moos Family Environment Scale and Sullivan's Diabetic Adjustment Scale. A family score consisting of the mean of the family members' scores was used in the analysis. Families who were well organized and emphasized personal growth had adolescents with better diabetic adjustment. In a study of thirty-three school-aged children and adolescents with sickle cell anemia, Moise (1980) as cited in Drotar, Crawford, and Bush (1984) reported that better adjusted children came from more cohesive families as measured by Moos Family Environment Scale.

As evident from the above research, there are various dimensions or ways to conceptualize the family environment. In this study, family environment is a term which describes the social climate within the family group. Social support and family strengths are the two indicators of family environment in this study. To date, very few studies have investigated the role of resources such as social support and family strengths and their relationship to diabetic adjustment and metabolic control.

Social Support

The literature on social support and health is extensive. Some brief comments will illustrate the complexity of the work on social support. To begin, the research on social

support is difficult to compare because of the lack of agreement of a precise conceptual definition of support (Carveth & Gottlieb, 1979; DiMatteo & Hays, 1981; Dimond & Jones, 1983; Leavy, 1983; Pearson, 1986; Thoits, 1982). The following definitions of social support demonstrate the complexity of this concept. Lin, Simeone, Ensel, and Kuo (1979) defined social support "as support accessible to an individual through societal ties to other individuals, groups and the larger community" (p. 109), a very general definition. More precise and frequently quoted definitions come from Cobb (1976) and House (1981). Cobb (1976) defined social support as "information leading the subject to believe that he is cared for and loved, esteemed, and a member of a network of mutual obligations" (pp. 300-301). House (1981) outlined four types of support including emotional support (caring, trust, and empathy); instrumental support (goods and services); informational support (giving information or teaching a skill which can provide a solution to a problem) and appraisal support (self-evaluation). Other researchers (Kaplan, Cassel, & Gore, 1977) described support as the degree to which an individual's needs for affection, approval, belonging, and security are met by significant others. Caplan (1979) defined social support along two dimensions: the objective-subjective dimension which distinguishes between structural aspects of the network and one's satisfaction with the network; the tangible-psychological dimension which focuses on material versus emotional or cognitive support. These conceptualizations of social support provide evidence for the very broad domain that has been associated with this concept. There is some discussion in the literature as to whether social support is a uni or multi-dimensional concept (Dean & Lin, 1977; Kaplan, Cassel, & Gore, 1977). Thoits (1982) argues that the amount, the type or kind (e.g. emotional, instrumental), and the source of support (e.g. spouse, friends) are important dimensions of social support.

Such variable definitions lead to a second difficulty, the measurement of the concept. While several instruments have been developed to measure social support, no

single instrument has been used consistently in studies of social support. In addition, researchers have developed their own instrument for a specific study with specific populations (e.g. Waller et al. 1986).

A related conceptual issue in the literature remains unresolved and requires mentioning. This refers to the two seemingly parallel yet separate areas of research, social support and coping. Research on coping and social support, both complex processes, have been studied separately despite the fact that both areas focus on how individuals adjust to stressors. Some researchers have asserted that social support is simply a helpful resource (Cohen & Syme, 1985; Cooke et al. 1988; McCubbin & Patterson, 1987; Pearlin & Schooler, 1978) which is received from family, friends co-workers, and community. Cobb (1976), Kaplan, Cassel, and Gore (1977) suggested that social support appears to enhance the possibility for effective coping. Consequently, some researchers then viewed social support as a coping resource (Gore, 1985; Stewart, 1983). Gore (1985) contrasted the idea of a coping resource with a coping activity, suggesting that coping resources represented a latent dimension of coping whereas a coping activity was the way in which people responded and sought available resources in response to a stressful situation. This coping activity is similar to other researchers' view that seeking social support from various sources is a coping strategy (Cohen & Lazarus, 1979; Holaday, 1984; Moos & Schaefer, 1984; Moos & Tsu, 1977).

In spite of the disagreements about social support, it is generally thought that social support has a beneficial effect on the health and well being of individuals. As such, it is said to function in three ways. Social support was said by some to have a direct effect on health (Killilea, 1980; Dimond & Jones, 1983). That is, support will have a beneficial effect regardless of whether persons are experiencing stress. Support is said to provide the individual with a sense of stability and self-worth. Others suggested that social support acted in a stress-buffering or mediating role. The stress-buffering role

was one involving an interaction between some source of stress and social support (Dimond & Jones, 1983; Wheaton, 1985) while the mediating role stimulated the mobilization of support resources (Dimond & Jones, 1983; Killilea, 1980; Wheaton,1985). Researchers often used stress-buffering and mediating interchangeably in the literature thus making interpretation of findings more difficult.

Despite the conceptual and measurement difficulties with social support, there is some evidence that social support is relevant for families with an adolescent diabetic. The majority of this research has primarily examined adolescent perceptions of parental support. Kaplan, Chadwick, and Schimmel (1985); Waller et al. (1986) found that adolescents whose parents were involved in the diabetic management routine perceived their family environment as supportive. Adolescents who relied on their parents for social support were in better metabolic control. This is in contrast to Hanson, Henggeler, and Burghen (1987 a) who found no correlation between social support and metabolic control. Other researchers (Hanson, Henggeler, & Burghen 1987 b) evaluated adolescent's and mother's perceptions of maternal support for the diabetic management routine. Poor adolescent metabolic control was associated with a lack of maternal support.

One of the purposes of this study is to examine the role of social support from the parent's perspective and how this affects diabetic adjustment and metabolic control in the adolescent. To date, only one study has examined the relationship between social support of the parents and metabolic control in adolescent diabetics. Newbrough, Dokecki, and Simpkins (1986) reported a positive relationship between social support of each parent and metabolic control of the adolescent as measured by $HbA1_c$ level. In other words, the more social support each parent received, the better the metabolic control of the adolescent.

To date, no studies have examined the relationship between social support of the parents and diabetic adjustment of the adolescent. Varni, Wilcox, and Hanson (1988)

studied mother's perceptions of social support in a group of 23 children with juvenile rheumatoid arthritis. These investigators reported that social support was a significant predictor of the child's psychological adjustment. Previous research with adults suggested similar findings. In a group of hearing impaired adults (Frankel & Turner, 1983), social support was found to be a significant predictor of psychological adjustment for these individuals.

The second indicator of family environment, family strengths, refers to internal family resources or attributes such as pride, loyalty, trust, respect and the family's sense of competency (Olson, Larsen, & McCubbin, 1982). These inner family qualities may contribute to successful family relationships thus facilitating a family's efforts in managing times of change within a family group. Adjustment to diabetes can be viewed as a chronic strain requiring continual adjustment and readjustment. Internal resources may facilitate this adjustment.

Little is known about the strengths diabetic families possess. Previous research has tended to view diabetic families from a problem oriented focus. There is a need to understand how these internal resources help families in the day to day management of the diabetic routine. Thus it is possible that a family's internal resources contribute to a positive and supportive environment within the family group.

A common finding in the literature indicated that mothers were primarily responsible for the supervision of the diabetic management routine (Anderson & Auslander, 1980; Etzwiler & Sines, 1962; Johnson & Rosenbloom, 1982; Pond, 1979; Sargent, 1985). This emphasis on maternal involvement has disregarded the study of fathers in many of the studies. Despite their lack of involvement with the diabetic management routine (Fallstrom, 1974) unless the diabetic adolescent was a male (Etzwiler & Sines, 1962), there is evidence that the father's role in diabetic management is an important one. Marrero, Jacobs, & Orr (1982) studied adolescent's perceptions of parental behavior. Adolescents in poor control perceived their father's

behavior as dominant and controlling while those in good control viewed it as supportive and encouraging of independence. More recently (Newbrough et al. 1986) examined social support of fathers in relation to metabolic control. Using the Arizona Social Support Inventory, he found metabolic control ($HbA1_C$) to be strongly associated with the total amount of support received from friends and coworkers; the more support the better the control.

In summary, the most common finding from these studies is that insulin dependent diabetic adolescents who live in emotionally, supportive environments are able to achieve better levels of diabetic adjustment and metabolic control. Although there is limited research on the resources of diabetic families, there is evidence to suggest that adjustment to diabetes and subsequent control may be facilitated by a family's social support and their system of internal resources. The role of the father in relation to diabetic adjustment and metabolic control is unclear.

Conclusion

Inspection of these four areas of the literature indicates that a chronic illness like diabetes, has a major impact on adolescents and their families. Diabetes impinges upon all areas of normal adolescent development, thus making achievement of developmental tasks, adjustment to and consequent control of diabetes more difficult. Various aspects of the relationship between diabetic adjustment and metabolic control have been studied. The most consistent finding suggests that adolescents who are well adjusted to diabetes have better levels of metabolic control.

More recently, researchers began to examine the influence of the family environment on metabolic control. Family environment has been found to be a predictor of both metabolic control and diabetic adjustment. Generally, it was found that supportive family environments contribute to good diabetic adjustment and metabolic control.

Thus the literature suggests that diabetic adjustment, family environment, and metabolic control are related. As limited research has been done on the relationship between family environment (using social support and family strengths as the two indicators) to diabetic adjustment and metabolic control, these relationships will be investigated in the present study.

CHAPTER 4

Methodology

Introduction

The data used in the current analyses were collected as part of a larger study (Kieren & Hurlbut, 1988) which examined the relationship between family problem solving and adolescent diabetic management. This chapter includes a description of those procedures and measures which were used to answer the research questions in the present study.

Sample

The sample for this study consisted of 40 family groups including mother, father and an adolescent with juvenile diabetes. Inclusion criteria for participation were: (a) an intact two parent family group (natural or blended), the blended family group having lived together for at least one year, (b) an adolescent between the ages of 13-18 having been diagnosed as diabetic for at least one year, (c) no other member in the family having a chronic illness which demanded high family involvement in its management.

The sample was identified from lists and names obtained from physicians who had adolescent diabetic patients, metabolic units at city hospitals, the local Canadian Diabetes Association office and The Juvenile Diabetes Association in Edmonton. According to Statistics Canada (1984), there are 60 and 62 diabetic males and females respectively per 100,000 population age 5-14 and 65 and 86 diabetic males and females respectively per 100,000 population age 15-19. In spite of these statistics, a great deal of difficulty was encountered in locating the sample. To supplement the above sample sources, advertisements were placed in local newspapers and participants, when interviewed, were asked for additional names. Each family was contacted initially by

letter (see Appendix A) and a follow-up phone call was used to determine interest and whether they met the inclusion criteria.

Instrumentation

Metabolic Control

The three most common ways to measure metabolic control for a diabetic person are home blood glucose monitoring, urine glucose monitoring and obtaining glycosylated hemoglobin levels ($HbA1_C$). While daily home blood glucose and urine glucose monitoring are necessary in order to make adjustments in insulin, diet or exercise, their results are often dependent upon technique, frequency of testing, and compliance. Consequently, these measures are unreliable with respect to obtaining a long term measure of blood glucose control. The $HbA1_C$ blood test is a more objective, long term measure of metabolic control (Blanc, Barnett, Gleason, Dunn, & Soeldner, 1981; Brownlee, 1982; Bunn, Gabbay, & Gallop, 1978; Nathan, Singer, Hurxthal, & Goodson, 1984). This was the method used in the present study to measure metabolic control. Glycosylated hemoglobin ($HbA1_C$) is a compound which results when some of the glucose from the blood stream combines with the hemoglobin in the red blood cell. The amount of glycosylated hemoglobin found in the red blood cell depends on the amount of glucose available to it over the 120 day life span of the red blood cell. Thus, this blood test represents a long term measure of glucose control over the preceeding two to three months before the test. Since this test measures glucose within a red blood cell, this level is more stable than plasma glucose which is affected by the metabolic processes within the body. In addition, this test minimizes the problems of multiple testing errors associated with blood and urine tests (Travis et al. 1987). Normal glycosylated hemoglobin levels indicate good control over a prolonged period of time, whereas increased values show that poor control has existed for several weeks prior to the blood test. Higher values indicate a higher average blood sugar and

thus more poorly contolled diabetics. Since results can vary from laboratory to laboratory, all blood samples were analyzed at the University of Alberta Hospital Laboratory. The normal range at this laboratory for the $HbA1_c$ blood test is 0.040 to 0.063. Metabolic control can be viewed as a continuum from poor to very good control. A medical diabetologist, E. Ryan (personal communication, November, 1986), delineated specific ranges of the $HbA1_c$ which can be associated with specific levels of control. Table 1 describes these levels of control and the ranges which were used to interpret the scores on this blood test.

Table 1

$HbA1_c$ Levels of Control and Ranges

Level of control	Range
very good	0.040 - 0.063
good	0.064 - 0.075
fair	0.076 - 0.09
poor	> .09

Diabetic Adjustment

Diabetic adjustment was measured by Sullivan's Diabetic Adjustment Scale (DAS) developed by Sullivan (1979 a). This instrument was originally designed for a sample of female adolescents with diabetes. This is a self-report, paper and pencil questionnaire used to assess adjustment in relation to the following five sub-scales: (1)

dependence-independence issues, (2) school adjustment, (3) family relationships, (4) relationships with peers, and (5) attitudes towards diabetes and body image concerns. Items were collected from interviews with diabetic adolescents, their parents, their clinicians, and other family members (Sullivan, 1979 a). Additional information was collected from the literature on adolescent development and the psychological aspects of diabetes. A factor analysis was done to determine the five adjustment areas. Sullivan (1979 a) reported statistically significant positive intercorrelations among the subscales (for example attitudes towards diabetes and relationship with peers). In the revised scale, 68 items were compiled and judged by a team of clinicians in psychiatry, pediatrics, and endocrinology as the items that best reflected the influence of diabetes on an adolescent's lifestyle.

Sullivan (1979 b) in a follow-up study administered the DAS to 105 adolescent girls and found that the level of female adjustment correlated with levels of self-esteem as measured by the Rosenberg Self-Esteem Scale, and depression as measured by the Beck Depression Inventory. The DAS was also administered to a sample of both female and male adolescents by Hauser et al. (1985) who found significant correlations between diabetic adjustment and family environment as measured by Moos Family Environment Scale. The above findings support the predictive validity of the DAS.

The scoring for the DAS is based on 50 of the 68 items (18 items are informational and do not assess adjustment). A 1-5 point system is used where one is the highest adjustment score for an item, and five is the lowest adjustment score. Overall, the range is 50-250; a low score indicates good adjustment while a high score, poor adjustment. There was no previously reported reliability. For the current sample, Kieren & Hurlbut (1988) reported Cronbach's alpha reliabilities of .90 for the total scale, .52 for dependence/independence, .44 for school adjustment, .82 for family relationships, .80 for peer adjustment, and .69 for attitudes toward diabetes and body functioning.

Social Support

The Social Support Inventory (SSI) (Cooke et al. 1988) is a 60 item self-report instrument that measures the amount of five kinds of support (emotional, esteem, network, appraisal and altruistic) and the amount of support from twelve identified sources (spouse or partner, children, other relatives, close friends, co-workers, church groups, spiritual faith, community groups, professionals, belonging to special groups, and reading books or watching T.V.). Each respondent indicates how much support they receive from each of the listed sources. Each response receives 2 points for "yes a lot", 1 point for a "yes" and 0 points for a "no" or a blank. The scale provides: (a) a total scale score by summing the raw scores, (b) subscale scores for the five kinds of support and (c) subscale scores for the 11 sources of support.

This questionnaire was originally constructed to assess the various aspects of social support for expectant and first time parents. Interviews were conducted which focused on the couples' sources of support and the perceived kind of support as given by each source. Content analysis was done to categorize the responses from the interviews into sources and kinds of support. In a study of parents who were enrolled in a parent education program, the test re-test reliability was .81 (Cooke et al. 1988). This instrument is relatively new and data indicating its usefulness in various contexts are just being collected.

Family Strengths

The Family Strengths Scale (Olson et al. 1982) was designed to assess family characteristics such as respect, trust, loyalty within the family, and characteristics relating to a family's sense of competency. Using two subscales, this self-report, five point Likert type rating scale measures two dimensions of family life; pride and accord. The Family Strengths Scale (FSS) contains 12 items to which the respondent can choose a response from the following: strongly disagree (1), moderately disagree (2),

neither agree nor disagree (3), moderately agree (4), and strongly agree (5). The scale provides a total score by summing the responses to the 12 items. In addition, two subscale scores are provided.

This scale and its subscales have been reported to have Cronbach's alpha reliabilities of .83; pride .88; and accord .72 (Olson et al. 1982). Kieren and Hurlbut (1988) report Cronbach's alpha reliabilities of .63 for the total scale; .86 for pride, and .69 for accord for this sample of respondents.

Procedure

The data for this study were collected in a multi-method study of family problem solving and diabetic management (Kieren & Hurlbut, 1988). The methods included paper and pencil questionnaires, focused interviews, and observed problem solving interaction. Each family group completed the major aspects of the study at the university in a single session. The study was explained and written consents were obtained from each participant (see Appendix B). The study consisted of the completion of questionnaires by each participant, a focused interview about how the family handled various aspects of diabetes management and observation of the family group solving three problem situations. The last two procedures were video taped. Details of the larger study are reported elsewhere (Kieren & Hurlbut, 1988). The adolescents had their venous blood samples for the $HbA1_c$ blood test collected shortly after the family was interviewed. When the blood test results were received, thus completing the data collection, a cheque for $25.00 was mailed either to the designated person in the family or donated to an agency as requested by the family. The family group was given the opportunity to request the group results of the research project (see Appendix C).

Design

For the purposes of the present project, only questionnaire data are being used. Thus, the design is survey in nature. Three independent variables; diabetic adjustment, social support and family strengths, are examined in this study. All scales are interval in nature. Metabolic control as measured by $HbA1_c$ is the dependent variable.

Analysis

The planned data analysis required the use of total scale scores from the adolescent on the DAS; the mother and father on the FSS and the SSI. Data from more than one family member can provide a broader perspective on the qualities of the family environment. Some researchers suggest that couple scores, as opposed to individual scores, be used when information is obtained independently from each member of the family group. Couple scores could be said to be valid if the correlations between fathers' and mothers' are similar in terms of direction, strength and consistency. Olson, McCubbin, Barnes, Larsen, Muxen, and Wilson (1983) suggested a minimum correlation of .50 to indicate such similarities. To determine whether couple scores could be utilized in this study, several correlations between fathers' and mothers' scores on the FSS and SSI were obtained. These correlations ranged from -.2182 to .5495. Because these correlations were low and related differentially, this was interpreted as evidence to support separate analyses of mothers' and fathers' data as opposed to constructing a couple score.

Before data analysis can begin, the issue of missing data must first be considered. The FSS and the DAS had only one and three missing values respectively. These were replaced by the mean value for that item for the appropriate respondent group. "The disadvantage to this procedure is that the correlations between a variable with a mean inserted in several spots and other variables will be lowered (closer to zero)"

(Tabachnick & Fidell, 1983, p. 71). These authors point out that the reduction in correlation depends on the amount of missing data. Since this study had little missing data, this should not present a problem. Items with multiple responses were replaced with a single response by flipping a coin. These aspects of the data cleaning had been done previously when Kieren and Hurlbut (1988) conducted their data analysis.

Responses to the SSI had a number of missing values. Of 80 completed questionnaires with 55 questions (a total of 4,400 responses) each, there were 48 missing values. An analysis of the pattern of missing data did not reveal a consistent pattern. Thus, all of these missing values were replaced with a "0" which meant that the respondent received "no social support". This method was also used by the developers of the SSI (Cooke et al. 1988). In addition, the SSI had one category for support received from "other" sources. Due to the propensity of missing data from this specific source, it was eliminated from scoring.

The statistical procedures were completed using the Michigan Interactive Data Analysis System (Midas) statistical program with the significance level set at $p < .05$. Characteristics of parents and adolescents were examined using descriptive statistics as reported in Kieren and Hurlbut (1988). Zero order correlations between all possible pairs of variables were calculated using Pearson Product Moment Correlations. Scale reduction was accomplished by principal components factor analysis. Regression analysis was used to test the effect of social support on the relationship between diabetic adjustment and metabolic control.

CHAPTER 5

Results

Introduction

This chapter begins with a detailed description of the parents and adolescents who participated in the study. It also contains a detailed description of the distribution of the scores on the variables tested in this study. The results are presented as a response to each research question. A summary and model of the key findings will conclude the chapter.

Description of the Sample

The participants in this study consisted of a non-random sample of forty Caucasian, natural or blended family groups including father, mother and an adolescent diabetic. All of the family groups had lived together for at least one year. The average number of children per family group was 3.2 with a range of 1 to 7 children. Only the father, mother and adolescent diabetic member of these families were studied. An average of 2.6 children resided at home with their parents. The Hollingshead Four Factor Index (Hollingshead, 1975), which uses occupational and educational status of both parents, was used to determine the socio-economic status of the family groups. In general, the families in this study could be described as middle class (see Table 2). Forty percent of the mothers were not employed outside the home. Fathers' (mean age 46.0 years) and mothers' (mean age 42.3 years) were in their forties. Forty-five and thirty-five and a half percent of mothers and fathers respectively had completed college or university education. The mean age of the adolescent participants was 15.4 with a range of 12-19 years. Equal numbers of males and females constituted the sample. Grade10 was the average grade placement of the adolescent participants. Thirty-seven and a half percent of the adolescents had a part-time job. The adolescents had diabetes from 1-17 years with an average duration of 6.2 years. The presence of another chronic illness (5

cases, either father or another child) was found in 6.5 percent of the families. These chronic illnesses did not require a high degree of family involvement in their management.

Table 2

Family Socioeconomic Status: Frequency and Percentage of Hollingshead Four Factor Index Groupings

	Number of Families	
	N	%
Major business and professional	8	20.0
Medium business, minor professional, and technical	19	47.5
Skilled craftsmen, clerical, sales workers	8	20.0
Machine operators, semiskilled workers	5	12.5
Unskilled laborers, menial workers	0	00.0
Total	40	100.0

Description of Key Variable Characteristics

Diabetic adjustment

This instrument, completed only by the adolescent, was intended to measure how well the adolescent integrated the demands of the diabetic management routine into one's daily lifestyle. The Sullivan Diabetic Adjustment Scale (1979 a & b) which contains 50 items, was used to measure five different aspects of adjustment: (1) dependence/independence, (2) school adjustment, (3) family relationships, (4) peer adjustment, and (5) attitudes toward diabetes and body functioning. The total scale has a range of 50 - 250 with a range of 50 -116 representative of good diabetic adjustment. A high score on the scale indicated poor diabetic adjustment. Mean scores for each of the five subscales and a total scale score were calculated. To test for gender differences, t tests were done. None were statistically significant. Table 3 summarizes the means, standard deviations, and p values for the total scale and each of the subscales.

The range for the present sample was 69-163 with a total mean score of 99.5 which, according to Sullivan, indicates that this group of adolescents is relatively well adjusted to diabetes. Females consistently had lower mean scores than the males, however these differences were not statistically significant.

Table 3

Mean Adolescent Scores on the Diabetic Adjustment Scale

	Mean Scale Scores			
	All (n=40)	Female (n=20)	Male (n=20)	p values*
Total diabetic adjustment scale	99.5 (20.6)**	95.7	103.3	.2450
Subscales				
dependence/ independence	16.6 (3.8)	15.8	17.5	.1752
school	17.8 (4.0)	16.9	18.7	.1649
family relationships	16.2 (4.7)	15.8	16.5	.2722
peers	17.7 (5.7)	16.7	18.7	.2890
attitudes to diabetes	31.2 (7.4)	30.5	32.0	.5147

* t -test, two tailed

( )** standard deviation

Family strengths.

This index was completed by all of the family members participating in the study. Because the primary purpose of this study was to examine qualities of the family environment from the parents' perspective, only the responses of the mothers and fathers were used. Two subscale scores, pride and accord, and a total scale score were calculated. A high score on this scale, which measures a family's internal resources, suggests that families have many resources and function within positive environments. In the large family study (N = 2,740) in which this scale was developed, Olson et al. (1983) reported a total mean score of 47.0 for mothers and 46.6 for fathers. No norms are available for the pride and accord subscales. Table 4 provides the means and standard deviations for the present sample of mothers and fathers.

In the present sample, mothers' scores ranged from 30-60 with a mean score of 46.4. Fathers' scores ranged from 28-59 with a mean score of 47.3. Mothers' mean scores were somewhat lower and fathers' mean scores were somewhat higher than the mean scores reported by Olson et al. (1983). These findings indicate that fathers have a more positive view of the family's resources and their ability to function within a positive environment than do mothers.

Table 4
Parents' Mean Scores on the Family Strengths Scale

	Mean Scale Scores	
	Mothers	Fathers
Total family strengths scale	46.4 (6.7)*	47.3 (6.8)
Subscales		
pride	30.3 (5.3)	30.4 (4.7)
accord	13.8 (4.0)	13.1 (4.1)

( )* Standard deviation

Social support

This scale was intended to measure five kinds of perceived support from eleven identified different sources as described in Chapter 1. Initially, mean sub-scores were obtained for each individual variable in the scale. Specifically, mean sub-scores for each source and each kind of support were calculated. These mean sub-scores were obtained by summing the raw scores for each of the individual variables in the scale and then dividing by the number of participants to get a mean score. The next step was to calculate total mean subscale scores for the11 sources of support and the 5 kinds of support. This was done by summing the previously obtained mean sub-scores and dividing by the number of questions in that category. Cooke et al. (1988) reported a total score of 11.258 in their sample of 118 parents participating in a parent education program of pre-school age children. Tables 5 and 6 illustrate the mean scores for the mothers and fathers on the SSI in the present sample.

In the present sample, both mothers and fathers received all kinds of support from all of the various sources indicating that there were no gaps in either kinds or sources of support. Mothers perceived they received more total support (11.1) than did fathers (10.8). Mothers received the highest amounts of support from their spouse (1.605), children (1.570) and their friends (1.255). On the other hand, fathers received the highest amounts of support from their spouse (1.725), children (1.665) and their relatives (1.100). Mothers received the least amount of support from community and belonging to special groups (.545) while for fathers, the least amount of support (.555) came from the media (e.g. reading books and watching television). For both mothers and fathers, most support fell into the categories of altruistic support (information which leads you to believe that you are worthwhile because of what you have done with and for others), and esteem support (information which leads you to believe that you are valued and respected for who and what you are and what you can do); whereas the least amount was appraisal support (information which provides you with feedback

about how you are doing and ideas for resolving difficulties). For mothers, the total scale score of 11.1 was similar to that of the original scale (11.0) while for fathers the total scale score was somewhat lower (10.8) than the original scale score.

Metabolic control ($HBA1_C$).

This long term measure of blood glucose ($HBA1_C$) had a range of 0.049 to 0.120 with a mean score of 0.087 and standard deviation of 0.019. A high score indicates poorer metabolic control. According to the standards set by the diabetologist, this group was rated as being in fair control. A student's t test was done to test for gender differences. Females had a mean score of .086 compared to .089 for the males. There were no statistically significant gender differences ($t = .50$, $p < .6202$). Table 7 provides the frequencies of the adolescents' $HbA1_C$ scores by gender and level of control.

Table 5

Mothers' Mean Scores on the Social Support Inventory

	Kinds of Support					
	emo	est	net	app	alt	mean
Sources of Support						
spouse/ partner	1.675	1.575	1.550	1.475	1.750	1.605
children	1.725	1.625	1.525	1.225	1.750	1.570
relatives	1.325	1.250	1.125	.825	1.325	1.170
friends	1.200	1.275	1.200	1.175	1.425	1.255
co-workers	.850	.950	.925	.550	1.025	.860
church	.825	.875	.825	.700	1.025	.850
faith	1.225	1.150	1.225	1.250	1.225	1.215
community	.450	.600	.550	.250	.875	.545
professionals	.700	.825	.850	.600	1.000	.795
special groups	.525	.600	.525	.350	.725	.545
media (TV, books)	.700	.550	.700	.650	.625	.645
Total	11.2	11.275	11.000	9.050	12.750	11.055
Mean	1.018	1.025	1.00	.8231	.1595	.025

Note. emo = emotional; est = esteem; net = network; app = appraisal; alt = altruistic

Table 6

Fathers' Mean Scores on the Social Support Inventory

	Kinds of Support					
	emo	est	net	app	alt	mean
Sources of Support						
spouse/ partner	1.750	1.725	1.750	1.525	1.875	1.725
children	1.725	1.750	1.750	1.225	1.875	1.665
relatives	1.200	1.200	1.150	.650	1.300	1.100
friends	1.050	1.150	1.050	.775	1.300	1.065
co-workers	.925	1.075	.900	.5250	1.250	.935
church	.850	.825	.825	.625	1.050	.835
faith	1.100	.975	1.100	.975	1.200	1.070
community	.600	.700	.650	.300	.925	.635
professionals	.650	.675	.675	.325	.700	.605
special groups	.575	.600	.550	.450	.750	.585
media (TV, books)	.475	.5250	.700	.650	.550	.555
Total	10.90	11.20	10.975	8.02	12.775	10.775
Mean	.9909	1.018	.9977	.7291	1.161	4.897

Note. emo = emotional; est = esteem; net = network; app = appraisal; alt = altruistic

Table 7

Frequency and Percentages of Adolescents' $HbA1_c$ Values According to Level of Control

	Frequency of Scores		
	All (n=40)	Females (n=20)	Males (n=20)
	N (%)	N (%)	N (%)
Levels of Control			
very good (.040 - .06)	6 (15)	1 (5)	5 (25)
good (.064 - .075)	6 (15)	5 (25)	1 (5)
fair (.076 - .09)	9 (22.5)	6 (30)	3 (15)
poor (> .09)	19 (47.5)	8 (40)	11 (55)

Findings Related to Research Questions

Zero order correlations were calculated using Pearson Product Moment Correlations to determine whether a relationship existed and, if so, to determine its magnitude and direction. A correlation of .3120 or more was needed to reach statistical signifance at the .05 level of probability.

Research Question 1: What is the relationship between diabetic adjustment and metabolic control?

There were positive correlations between diabetic adjustment and metabolic control whether adjustment was measured as a total score or as subscale scores. However, this relationship was significant for only one subscale, attitudes toward diabetes and body functioning. This relationship indicated that a better or more positive attitude to diabetes was associated with a better level of metabolic control. Table 8 summarizes the correlations between these two variables, using the total and subscale scores of the diabetic adjustment scale.

Table 8

Zero Order Correlations Between Diabetic Adjustment and Metabolic Control ($HbA1_c$)

Adolescents' diabetic adjustment	$HbA1_c$
Total scale	.3034
Subscales	
dependence/independence	.2201
school adjustment	.2842
family relationships	.1487
peers	.2219
attitudes toward diabetes	.3231*

*$p < .05$

Research Question 2: What is the perceived quality of the family environment as measured by two indicators, social support and family strengths, for parents with an adolescent diabetic?

a. What are the kinds, sources and amounts of social support for parents with adolescents who have diabetes?

The scores on the SSI (see Tables 5 & 6) indicate that the parents received all kinds of support from all of the listed sources. Mothers provided more support to the fathers; thus mothers were the primary givers and fathers the primary receivers of support. Within the family, support from spouse and children provided the major sources of support for each parent. Outside the family, in order of amount, mothers received most of their support from friends, faith and relatives; whereas fathers received most of their support from relatives, faith and friends. The majority of the sources provided high amounts of altruistic support. Thus, these parents feel good about themselves, and in turn, receive a lot of support from helping others.

Scores on the FSS (see Table 4) measured two resources, pride and accord. This scale is a measure of a family's internal resources such as love, respect, family loyalty and a family's sense of competency. The relatively high mean scores on this scale indicated that these families have many internal resources, as perceived by the parents, thus facilitating these families to function within positive environments.

The findings of this study seem to suggest that the parents of this group of diabetic adolescents have a number of internal and external resources, to draw upon in times of need. It seems likely that this group of adolescents live in emotionally supportive environments, ones in which the physical, emotional and spiritual needs of the members can be met. The findings suggest that the family environments are interactive; mothers and fathers are involved with each other, their children and the social context of the larger community. Support is received from others, such that there seems to be a

lot of inter family cooperation, providing a sense of loyalty and trust among its members. Thus, one could conclude that, in the present sample, the quality of the family environment could be said to be relatively high.

Research Question 3: What is the relationship between these two family environment indicators (social support and family strengths) and metabolic control?

a. What is the relationship between social support and metabolic control?

A number of steps were undertaken in order to answer this question. To begin, zero order correlations were calculated between each individual item (or variable) in the Social Support Inventory Scale, and metabolic control. This was done separately for mothers and fathers. Tables 9 and 10 summarize these variables and their correlations. As evident in Tables 9 and 10, 14 and 3 correlations were statistically significant for mothers and fathers respectively. Scores on each of these variables were examined using scattergrams to determine possible outliers which may have influenced the size of the correlation coefficient. The outliers were identified, deleted and the regressions run. There were no changes in the correlation coefficients between these statistically significant relationships in the re-analyses.

To help simplify and reduce data complexity, and to handle the small sample size, composite indices on the Social Support Inventory were constructed which "combine several (or many) items intended to measure the same global construct" (Miller, 1986, p. 96). To do this, tables of intercorrelations were set up among the statistically significant variables that were thought to measure a single construct. For each new composite index constructed, the correlation matrix was limited to those components which had correlations greater than .3120. However, there were three variables which

had lower correlations. These three variables hung together well within their respective correlation matrix, thus they were retained.

The resulting sets of intercorrelations were then factor analyzed using a principal components factor analysis in order to determine the minimum, interpretable number of factors. For each set of intercorrelations analyzed, only one factor resulted with similar factor loadings on each of the variables in the correlation matrix (see Appendix D for factor loadings). For this reason, a rotated factor analysis was not done. The scores on the individual variables in each factor were then added.

For the mother, a total of three constructed indices of social support were derived by this method: (1) all kinds of support from friends and network support from relatives, (2) all kinds of support from groups and esteem and network support from community and (3) altruistic support from spouse, children, faith, and media. The friends and relatives index was arrived at by adding the responses on network support from relatives and the responses on all of the kinds of support from friends (see Table D 1 for factor loadings). Groups, the second index, was constructed by adding the responses from all of the five kinds of support from groups and esteem and network support from the community (see Table D 2 for factor loadings on these variables). The third constructed index, called altruism, resulted from adding the responses on altruistic support from spouse, childen, faith and media (see Table D 3 for the factor loadings). These three measures are referred to as composite measures of social support.

For fathers, one constructed index, support from religion, and one individual item from the scale, support from various sources of media, were identified as the two composite measures of social support. Responses on the altruistic and network support variables from church and faith were added and called the religion index (see Table D 4 for factor loadings on these two variables). One variable, network support from media, was retained as a single item measure from the scale (thus not constructed) because its

correlation with metabolic control was positively and statistically significant at the .01 level, and quite different from the other kinds of support in that category (see Table 10).

Correlations between scores on each of these composite indicators of social support and metabolic control were then run. The relationships between scores on these composite indices of social support and metabolic control were positive and statistically significant at the .01 level for both mothers and fathers (see Table11). The poorer the metabolic control of the adolescent, the higher the amount of social support of the parents as measured by these indices.

b. What is the relationship between family strengths and metabolic control?

Family strengths, as measured by the FSS, provided a total scale score and two subscale scores. The correlations between family strengths for both mothers and fathers and metabolic control were all positive but non-significant (see Table E 1). The correlations ranged from .0288 to .1811.

To conclude, the relationship between these two indicators of family environment, social support and family strengths, indicated that only social support was significantly associated with metabolic control. This was a positive correlation (but a negative relationship). The higher the social support of the parents, the higher or poorer the metabolic control of the diabetic adolescent. (A high score on the metabolic control scale indicates poor control). There was no significant relationship between family strengths and metabolic control.

Table 9

Mothers' Zero Order Correlations Between Social Support and Metabolic Control ($HbA1_C$)

	Kinds of support				
Sources of support	Emotional	Esteem	Network	Appraisal	Altruistic
spouse/ partner	.0355	.0420	.1189	.0033	.3703*
children	.0116	.1413	.0192	.1732	.3313*
relatives	.2631	.1780	.3145*	.0627	.2084
friends	.3404*	.2065	.3141*	.2835	.3795*
co-workers	.1462	.1158	.0747	-.0676	.1113
church	-.0591	-.1014	-.0079	-.1372	-.0933
faith	.0863	.0182	.2172	-.0572	.3782*
community	.1307	.3145*	.3310*	.0526	.1893
professionals	.0146	.1040	.0761	.1654	.1302
special groups	.2455	.5098**	.5233**	.3533*	.4262**
media	.2411	-.0496	.2109	.0595	.3055*

* $p < .05$
** $p < .01$

Table 10

Fathers' Zero Order Correlations Between Social Support and Metabolic Control ($HbA1_C$)

	Kinds of Support				
	Emotional	Esteem	Network	Appraisal	Altruistic
Sources of support					
spouse/ partner	.2888	.1536	.2621	.0482	-.0345
children	.1972	.3011	.2801	-.0960	-.0384
relatives	.1285	-.1719	.0048	-.1325	-.0455
friends	.1117	-.1003	-.1168	-.0546	-.1413
co-workers	.1241	-.2974	-.1105	-.0605	-.1563
church	.1600	.1481	.2298	.2339	.4204**
faith	.1452	.2042	.3305*	.1781	.0600
community	.0641	.2189	.1065	.0808	.0398
professionals	-.1031	.0045	-.0906	.2968	.0439
special groups	-.0195	.0291	.0793	.2803	.0657
media	.2902	.2117	.4636**	.2689	.2839

* $p < .05$
** $p < .01$

Table 11

Zero Order Correlations Between the Composite Indices of Social Support, Diabetic Adjustment, and Metabolic Control ($HbA1_c$)

Social support	Diabetic Adjustment	Metabolic Control
Mothers' variables		
groups	.3283*	.4662**
friends and relatives		.4145**
altruism		.4605**
spouse	-.3852*	
children	-.3941*	
Fathers' variables		
religion		.4380**
network support from media		.4636**
altruistic support from spouse	-.4126**	
emotional support from children	-.4179**	
groups	.3433*	

Note. All of these composite measures of social support were constructed except for three of the father's variables (network support from media, altruistic support from spouse and emotional support from children).

* $p < .05$

** $p < .01$

Research Question 4: What is the relationship between these two family environment indicators (social support and family strengths) and diabetic adjustment?

a. What is the relationship between social support and diabetic adjustment?

A similar procedure to that described in the previous section was followed. Zero order correlations were calculated between each individual item in the Social Support Inventory and each subscale score and total scale score of the Diabetic Adjustment Scale. Again, this was done separately for mothers and fathers. For mothers, across all of the five subscales, support from spouse and children were most consistently correlated (all were negative) with each subscale and total scale score (see Tables 12 and 13). Separate tables of intercorrelations were set up among the spouse, and children variables. As in the foregoing discussion, the resulting tables of intercorrelations were factor analyzed, with one factor resulting from each set of intercorrelations.

For mothers, two new composite indices were constructed, support from spouse and support from children. Support from spouse included four variables (emotional, esteem, network and appraisal support). For these four variables, the zero order correlations across all of the diabetic adjustment subscales and total scale ranged from -.1254 to -.5419 (see Table 12). The scores on these four variables were then summed and called spouse (see Appendix F 1 for the factor loadings on these variables).

The above procedure was also followed for support from children. The zero order correlations on the four variables (emotional, esteem, network and appraisal support) ranged from -.0838 to -.4983 (see Table 13). However, the correlations on the appraisal variable were quite low (-.0838 to -.1509). Because this variable hung together well with the other three variables (emotional, esteem, network) it was retained. Thus the responses on these four kinds of support were summed into one new composite index and called children. Altruistic support was not included in these

two composite indexes because we already had a measure of altruistic support (see Table F 2 for the factor loadings).

For fathers, one composite index was constructed, support from groups. Zero order correlations on the emotional, esteem, network, appraisal and altruistic support variables across all of the subscales and total scale ranged from -.0189 to .3843 (see Table 14). Scores on these five variables were summed and a new composite index constructed, called groups (see Table F 3 for the factor loadings).

For fathers, two individual items in the SSI scale were retained as single measures of support. The zero order correlation between altruistic support from spouse (-.4126) was quite different from the other correlations across the subscales (see Table 15). Further, summing the five kinds of support into one variable did not correlate significantly with the diabetic adjustment measure (attitudes to diabetes). Therefore, it was left as a single item measure of support.

The zero order correlations between emotional support from children across all of the diabetic adjustment subscale scores and total scale scores, were quite high and ranged from -.2503 to -.5666 (see Table 16). Only emotional support from children correlated signifcantly with the attitude subscale. Thus this was left as a single item measure as well.

To summarize, five composite measures of social support were identified and then correlated with the diabetic adjustment variable (attitudes to diabetes). Support from spouse and children negatively correlated with diabetic adjustment for both mothers and fathers. The more support from spouse and children, the better the diabetic adjustment. (A low score on the diabetic adjustment scale indicates better diabetic adjustment). For fathers, support from groups, positively correlated with diabetic adjustment. In other words, the poorer the level of diabetic adjustment the more support was received from groups. Table 11 describes the correlations between these five indices of social support and diabetic adjustment.

b. What is the relationship between family strengths and diabetic adjustment?

All of the zero order correlations between these two variables were statistically non-significant. Correlations ranged from -.2606 to .1579 for the mothers and from -.2004 to .1902 for the fathers (see Table G 1). Thus there was no significant relationship between family strengths and diabetic adjustment.

To conclude, the relationship between these two family environment indicators, social support and family strengths, indicated that only social support was significantly associated with diabetic adjustment as measured by attitudes to diabetes. Five measures of social support were identified as composite measures of social support. For mothers, support from spouse and children was negativley associated with diabetic adjustment. The more support the mother received from these two sources, the better the diabetic adjustment. For fathers, altruistic support from spouse and emotional support from children was also negatively associated with diabetic adjustment. The more support the father received from these two sources, the better the diabetic adjustment of the adolescent. For fathers, support from groups was positively associated with diabetic adjustment. The poorer the diabetic adjustment, the more support was received from this source.

Table 12

Mothers' Zero Order Correlations Between Social Support and Diabetic Adjustment: Support from Spouse

	diabetic adjustment subscales					
	SS_1	SS_2	SS_3	SS_4	SS_5	T S.
social support variables						
emotional	-.4934**	-.2448	-.3323*	-.4358**	.2416	-.4222**
esteem	-.5419**	-.1748	-.3895*	-.3450*	-.3543*	-.4463**
network	-.4708**	-.2586	-.3467*	-.3864*	-.4577**	-.4879**
appraisal	-.4829**	-.1254	-.3314*	-.3365*	-.2644	-.3776*

Note: SS_1=dependence/independence; SS_2=school adjustment; SS_3=family relationships; SS_4=peers; SS_5=attitudes to diabetes; T S= total scale.

* $p < .05$
** $p < .01$

Table 13

Mothers' Zero Order Correlations Between Social Support and Diabetic Adjustment: Support from Children

	diabetic adjustment subscales					
	SS_1	SS_2	SS_3	SS_4	SS_5	T S
social support variables						
emotional	-.2838	-.3076*	-.1122	-.1723	-.2569	.2775
esteem	-.3370*	-.1371	-.2517	-.2067	-.3154*	-.3172*
network	-.4263**	-.3110*	-.2913	-.2912	-.4983**	-.4653
appraisal	-.0838	-.0974	-.0854	-.1044	-.1896	-.1509

Note: SS_1=dependence/independence; SS_2=school adjustment; SS_3=family relationships; SS_4=peers; SS_5=attitudes to diabetes; T S= total scale.

* $p < .05$
** $p < .01$

Table 14

Fathers' Zero Order Correlations Between Social Support and Diabetic Adjustment: Support from Groups

	diabetic adjustment subscales					
	SS_1	SS_2	SS_3	SS_4	SS_5	T S
social support variables						
emotional	.0620	.1705	.0061	-.0189	.1303	.0872
esteem	.0738	.2186	-.0259	-.0396	.2707	.1361
network	.1714	.2599	.0154	.0045	.3834*	.2243
appraisal	.1913	.2117	-.0756	.0359	.2695	.1656
altruistic	.1397	.3166*	.1522	.1378	.3843*	.2979

Note: SS_1=dependence/independence; SS_2=school adjustment; SS_3=family relationships; SS_4=peers; SS_5=attitudes to diabetes; T S= total scale.

*$p < .05$

Table 15

Fathers' Zero Order Correlations Between Social Support and Diabetic Adjustment: Support from Spouse

	diabetic adjustment subscales					
	SS_1	SS_2	SS_3	SS_4	SS_5	T S
social support variables						
emotional	-.1645	+.0554	-.4268**	-.3491*	-.0296	-.2250
esteem	-.1651	-.0355	-.3761*	-.3117*	-.2109	-.2858
network	-.1339	+.1293	-.2413	-.1130	-.0731	-.0603
appraisal	-.1166	+.1086	-.3404*	-.2371	-.0906	-.1770
altruistic	-.2379	-.2539	-.3118*	-.2756	-.4126**	-.3890*

Note: SS_1=dependence/independence; SS_2=school adjustment; SS_3=family relationships; SS_4=peers; SS_5=attitudes to diabetes; T S= total scale.

* $p < .05$
** $p < .01$

Table 16

Fathers' Zero Order Correlations Between Social Support and Diabetic Adjustment: Support from Children

	diabetic adjustment subscales					
	SS_1	SS_2	SS_3	SS_4	SS_5	T S
social support variables						
emotional	-.4174**	-.2503	-.6161**	-.5407**	-.4179**	-.5666**
esteem	-.2716	-.0776	-.4392**	-.1951	-.2825	-.3216*
network	-.1645	-.0332	-.3402*	-.0719	-.1166	-.1768
appraisal	-.1585	-.1907	-.5206**	-.3146*	-.1864	-.3395*
altruistic	-.3782*	-.0798	-.2794	-.2622	-.1850	-.2886

Note: SS_1=dependence/independence; SS_2=school adjustment; SS_3=family relationships; SS_4=peers; SS_5=attitudes to diabetes; T S= total scale.

* $p < .05$
** $p < .01$

Research Question 5: How does social support affect the relationship between diabetic adjustment and metabolic control?

Before this question could be answered, a correlation matrix of the previously obtained ten composite measures of social support was run to ensure that the measures were not highly correlated with each other. The correlations, which ranged from -.0420 to .7392, indicated that these composite indices were measuring different aspects of social support (see Table 17). Although one pair of variables has a relatively high correlation (.7392), Tabachnick and Fidell (1983) state that multicollinearity occurs when two variables are nearly perfectly correlated. Values in excess of .99 would indicate redundant variables. Thus, this relatively high correlation (.7392) in the present study should not present a problem.

Multiple regression analysis was used to answer this question by entering first, the dependent variable (metabolic control), the diabetic adjustment variable (attitudes to diabetes), the composite indice for social support, and the cross product term (ie. the interaction effects of diabetic adjustment times social support). The cross product terms determined whether social support buffered the relationship between diabetic adjustment and metabolic control. This procedure was done for each of the 10 measures of social support. In each instance the cross product term (or interaction term) was non-significant, indicating that the positive association between diabetic adjustment and metabolic control was not buffered by social support (see Table H 1).

Table 17

Intercorrelations Among the Composite Indices of the Social Support Variables

1.	1.000									
2.	.4434	1.000								
3.	.2946	.2089	1.000							
4.	.1717	.2449	.3324	1.000						
5.	.2337	.1586	.1642	.0308	1.000					
6.	.1875	.4459	.0386	.2961	.0393	1.000				
7.	.2563	.3953	.1030	.0505	.0191	.7392	1.000			
8.	-.1338	-.1279	.0085	.0746	-.1449	.1405	.1210	1.000		
9.	.1288	.0568	.0272	-.0258	.1264	.4631	.4337	.4444	1.000	
10.	.0781	.2034	.3333	.0763	.2126	-.0420	-.0729	-.1086	-.0197	1.000
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.

Note. 1.= altruism; 2.= friends/relatives; 3.= groups (mother); 4.= religion; 5 = media; 6.= spouse (mother); 7. = children (mother); 8.= altruistic support father; 9.= emotional support children (father); 10 = groups (father).

Summary of Key Findings

This study examined the relationship of three variables, diabetic adjustment, family strengths, and social support to metabolic control. The key findings are summarized below. Following the summary two models represent the findings. These are heuristic models which show the relationships between the variables These models do not represent causality.

1. There were no gender differences in either diabetic adjustment or metabolic control.

2. There was a positive and statistically significant relationship between diabetic adjustment and metabolic control. Adolescents with a positive attitude toward diabetes were more likely to be in better metabolic control.

3. The relationship between family strengths and diabetic adjustment was statistically non-significant.

4. The relationship between family strengths and metabolic control was statistically non-significant.

5. There was a positive and statistically significant relationship between social support for both mothers and fathers and metabolic control of the diabetic adolescents. This indicated that more social support of the parents was associated with poorer levels of metabolic control in the diabetic adolescents. This is in contrast to the literature which, although very limited, suggests that more support received by the parents is associated with better metabolic control in the adolescent.

6. Both mothers and fathers received support from all of the listed sources. However, the sources of support that were statistically significant in relation to metabolic control were different for mothers and fathers. For mothers, two sources and one kind of support were identified as composite indices of social support. The two sources included support from friends, relatives and groups. Altruistic support was the only significant kind of support received. For fathers, support from religion and media were significant.

7. The relationship between social support and diabetic adjustment was different depending on the source of support. For both mothers and fathers, there was a statistically significant, but negative relationship between support from spouse and children and diabetic adjustment. This indicated that the more support from these two sources, the better the diabetic adjustment (as measured by the adolescent's attitude to diabetes).

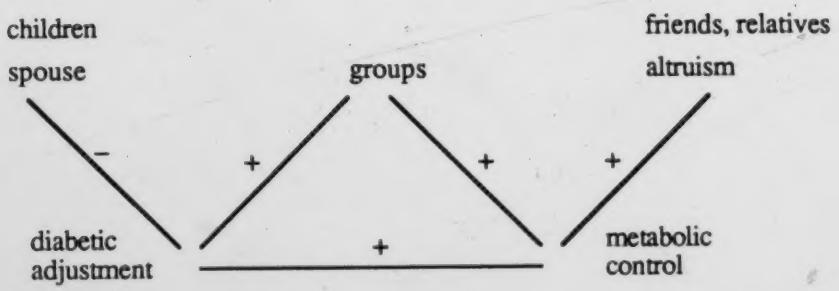
8. Support from groups was statistically significant and positively associated with diabetic adjustment. That is poorer levels of diabetic adjustment was associated with more support of the parents. This was statistically significant for both mothers and fathers.

9. In total, a multi-dimensional grouping of eight sources and one kind of support were identified as composite measures of social support.

10. The interaction terms were not statistically significant. Thus there was no support for the buffering model.

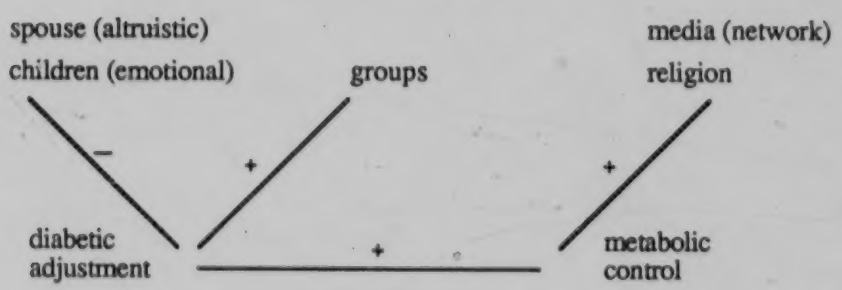
MODEL OF FINDINGS

FIGURE 2. MODEL OF THE RELATIONSHIP OF SOCIAL SUPPORT AND DIABETIC ADJUSTMENT TO METABOLIC CONTROL: MOTHERS



MODEL OF FINDINGS

FIGURE 3. MODEL OF THE RELATIONSHIP OF SOCIAL SUPPORT AND DIABETIC ADJUSTMENT TO METABOLIC CONTROL: FATHERS



CHAPTER 6

Discussion

Introduction

The purpose of this chapter is to present a discussion of the findings, including both practical and theoretical issues. Each of the key findings in the study will be discussed beginning with the measure of metabolic control. A new theoretical model proposing the relationship between these three variables is presented, followed by a discussion of the major methodological issues involved in this study. Lastly, limitations of this study and implications of the findings for diabetes educators will be reviewed.

Diabetic Adjustment and Metabolic Control

The measure of metabolic control was based on a non-fasting blood test ($HbA1_c$) which reflected a long term measure of metabolic control. This group of diabetic adolescents ranged from poor to very good control, with an average rating of fair control. However, based on the total sample 30% were in very good to good control, while 70% were in fair to poor control. The high proportion of diabetic adolesents in the fair to poor category substantiates the difficulty adolescents experience in maintaining adequate metabolic control. It seems possible that other biological or psychosocial variables may be influencing metabolic control. Or, as indicated in research by Grossman (1987), many adolescents maintain high blood glucose levels in a conscious effort to avoid mild hypoglycemia in the presence of their peers. Although there were variations on the scores between males and females, there were no statistically significant gender differences. This parallels the findings of Etzwiler and Sines (1962). Other researchers (Simonds et al. 1981) have found that adolescent girls (13-19) had poorer levels of metabolic control than did adolescent males.

Diabetic adjustment was based on Sullivan's Diabetic Adjustment Scale. It measured five aspects of adjustment; dependence/independence, school, relationships

with peers, and family, and attitudes to diabetes. According to this measure, the present sample was relatively well adjusted to the disease. Here is the perplexity: while this group of adolescents were relatively well adjusted, they only achieved a rating of "fair" metabolic control. This raises the question, can family environmental factors help explain this discrepancy? Is it possible that qualities of the family environment, a psychosocial variable, can influence a physiological state?

Regarding the relationship between diabetic adjustment and metabolic control, a positive relationship between these variables was expected; better adjustment, better control. This proposed relationship was substantiated but was only statistically significant between one subscale, attitudes to diabetes, and metabolic control. Adolescents who had more positive attitudes to diabetes had better metabolic control. However, it should be pointed out that the relationship between the entire diabetic adjustment scale and metabolic control was very close to statistical significance ($r = .3034$; $r = .3120$ $p < .05$)). The present findings support previous evidence that developing a positive attitude to diabetes is an important factor in achieving acceptable levels of diabetic adjustment (Sullivan, 1979 b) and metabolic control (Ludvigsson, 1977). A closer look at the "Attitudes to Diabetes" subscale items may shed some light on why only this subscale was significant. Overall, these items are very general, reflecting attitudes to eating, insulin reactions, complications, and the future. Items in the other four subscales tend to be more specific. Perhaps the more general items are better indicators of diabetic adjustment.

Social Support and Metabolic Control

It was expected that increased or more social support of the parents would have a beneficial effect on adolescent metabolic control (lower scores on the metabolic scale indicate better levels of control). This relationship was just the opposite! The direction

of the correlation was such that the more social support of the parents, the higher or worse the metabolic control of the adolescent.

Understanding this contradictory finding may be helped by reviewing the coping and stress literature. Lazarus' view of coping and stress provides potential direction for the interpretation of these results. Lazarus suggests in his theory, that social support may be viewed as a coping strategy (seeking support from various sources). In view of the present results, it seems possible that acquiring a high level of social support represents a coping effort on the part of the parents with diabetic adolescents who are having difficulty achieving good levels of metabolic control.

According to Lazarus & Folkman (1984) each individual has a unique perception of an event and how one appraises the event will affect the person's response to the event. Lazarus & Launier (1978) indicate that the individual's appraisal of the alternatives for managing a stressful situation is a secondary appraisal which mobilizes the coping process. Thus, in the present study, the mother's and father's appraisal of the event (diabetic adolescents having difficulty achieving good levels of metabolic control) may have been perceived as a harmful event in which the health or well being of the adolescent and the family was at risk. The response to this situation may therefore have been to seek social support in the form of help or information which was needed to manage the situation.

These findings should be regarded only as tentative and are based on the writer's interpretation of the findings using the coping and stress literature. Tentative as they are, these findings raise important questions for future consideration. For example, to what extent are diseases like diabetes subject to psychosocial control? How much control does the individual have in controlling a metabolic illness like diabetes? Should researchers continue to look for a relationship where we can change metabolic control? What implications do these findings have for the social support literature?

In spite of our advancing knowledge about diabetes, and other illnesses such as hypertension and arthritis, there is no known cure. Existing methods of treatment, medication, diet, and exercise, enable the individual to function more or less normally by correcting or alleviating the symptoms of the disease. In a conventional bio-medical model psychosocial factors are generally regarded as secondary.

One could pose a strong argument for greater consideration of these factors. We are endowed with biological and psychological mechanisms that enable us to respond adaptively and adjust to illness. We are not going to cure a physiological state like metabolic control. However, a physiological state impacts on the psychological and socio-emotional state of the individual. Adjustment to a disease implies participation of the mind as well as the body and therefore it is up to the individual to mobilize their own natural defense mechanisms. Thus, one's mental attitude may well influence future adjustment to a disease. One's ability to mobilize these defense mechanisms depends on complex factors including genetic predisposition, experiences in early childhood and other social and cultural elements. It is the individual's own psychobiological constitution that may or may not mobilize their own defense mechanisms.

In terms of future research what might this mean? Instead of examining a myriad of psychosocial factors such as social support that may or may not influence disease outcomes (ie metabolic control) perhaps researchers should more closely examine an individual's adjustment to diabetes. The findings of this study seem to suggest that one's attitude toward diabetes is an important factor in one's adjustment to the disease. Thus perhaps the emphasis should be directed at psychological and psychosocial influences of the disease. How one mobilizes his/her own denfense mechanisms to adjust to the disease may provide a new avenue for future research. It may be that it is not the outcome that is all encompassing but the quality of life that one has that is important.

Gender Differences in Sources of Support

In addition to the relationship between social support and metabolic control being opposite to what was expected, there were also differences in the sources of support for mothers and fathers. For mothers, the most significant sources of support were from friends, relatives and belonging to special groups. In the present study, support from friends and relatives was not related to better metabolic control in the adolescent. This is in contrast to Newbrough et al. (1986). These authors reported that more socially involved mothers who had a large network of friends, had diabetic adolescents who had better levels of metabolic control.

Groups were a significant source of support for the mothers but not fathers in this study. Support from this source may have been used to help the mothers cope when the adolescents were having difficulty achieving acceptable levels of metabolic control. According to Papatheodorou (1985) belonging to groups can provide a mutual sharing network; an opportunity for exchange with others and a time to share common experiences. This study did not ask what kind of groups the mothers belonged to. Future research could be directed at finding out how groups support mothers in dealing with their adolescent's diabetes.

The finding that altruistic support was a significant kind of support for mothers was also surprising. Approaches by Berkowitz (1972) and Schwartz (1970) facilitates an interpretation. These researchers maintain that, as part of one's self-concept, one may have certain self-expectations that require altruistic actions. "Anticipation of or social conformity to self-expectation results in pride, enhanced self-esteem, security, or other favorable self-evaluations; violation or its anticipation produces guilt, self-depreciation, loss of self-esteem or other negative self-evaluations (Schwartz, 1977, p. 231)." Thus in the present study, these self-expectations may be to support and assist the diabetic adolescent with the management routine, of which the ultimate goal is to achieve a good

level of metabolic control. When confronted with the realization that the teen was not in good metabolic control, it may have been possible that the mothers' altruistic behavior was "motivated by the desire to act in ways consistent with one's values so as to enhance or preserve one's sense of self-esteem and avoid self-concept distress (Schwartz, 1977, p. 226)". In other words, the behavior may have been initiated in order to maintain one's self-image as a "good mother" and avoid further personal distress.

Information from this study on the father's social support structure is relatively new data in the diabetes field. Again, it is interesting that of the 11 listed sources of support, fathers received the least amount of support from the media, yet this source of support was significantly related to metabolic control. Newbrough et al. (1986) found that support offered to fathers was the provision of diabetes information. One coping strategy mentioned by Cohen and Lazarus (1979) is to seek relevant information about issues relating to a specific problem or concern. Thus perhaps in the current study, fathers were trying to gain some sense of control and mastery by reading diabetes related information.

The finding which identified religion (a composite measure of network support from faith and altruistic support from the church) as a significant source of support for fathers was interesting. Past research has reported that being religious and having a belief in God was a coping strategy used by parents handling the everyday life stresses of parenthood (Ventura, 1982). This strategy was perceived to be more helpful for mothers than for fathers. The results of the present study suggest that this group of fathers received support from religious sources and may derive a sense of security from having faith in God. In addition, they may feel worthwhile because of their involvement in the church. Based on one's faith, religion provides a set of beliefs, common values and a set of guidelines for living which may help to strengthen the family group. In a more recent study, Wertlieb, Hauser, and Jacobson (1986)

compared family environments of a group of recently diagnosed diabetic children and a sample of acutely ill children. The group of diabetic children (range 9 to 16 years) perceived their family environments as having greater moral religious orientations. These results in conjunction with the present findings seem to suggest that families with a chronically ill adolescent may have a stronger family emphasis on moral religious values and turn to religion for the long haul. Future research should consider more qualitatively, the influence of religion on family environment and its relationship to diabetic management. A qualitative study may provide more insight and understanding of the role of faith and religion to fathers of adolescent diabetics, thus providing meaning to these statistical findings.

To conclude, in this study social support was defined as a resource which referred to the amount, source and kind of interactions and exchanges among people (Cooke et al. 1988). In contrast to resources, something that one has; coping is an activity, something that one does. Coping often involves using available resources to manage a particular situation. The results of the present study suggest that social support received by the parents appeared to be employed as a coping strategy when confronted with an adolescent who was having difficulty achieving acceptable levels of metabolic control. Rather than support being a part of the person, it was acquired by seeking it out. Both mothers and fathers responded similarly, although the resources used differ. This response could be related to the parents' feelings of helplessness in dealing with their adolescents' poor metabolic control or parental feelings of guilt (Lahood, 1970; Pond, 1979). It is possible that the disease and the likelihood of complications may prevail in the minds of the parents, thus creating more intrapersonal distress.

Mothers and fathers received support from all of the listed sources. As discussed previously, the sources of support that correlated significantly with metabolic control were different for mothers and fathers. These findings suggest that women participate in wider social networks and receive more informal support from others than do men.

In a study comparing 148 parents (74 couples) of healthy children, parents with an autistic child, and parents with diabetic children, Ferrari (1986) found that mothers reported a higher perceived level of social support than did fathers. Additionally, parents of the diabetic children perceived the lowest amounts of social support of the three groups. Mothers of diabetic children are often more involved and perhaps more affected by the diabetic management routine than fathers, thus they may require more support. It could be that the fathers in the present study may have fewer needs for social support because, traditionally, they are not as closely involved in the day to day diabetic management routine. Perhaps the close involvement of the mother contributes to the father's tendency to remain more distant in terms of the daily routine. It is possible that having a chronically ill adolescent with diabetes may have adverse effects on the father's perceived level of support even though, in the present study, they received almost the same amount of support as the mothers. This raises some interesting questions. Do fathers perceive a greater need for social support, but report lower scores or, do they actually receive less support? It may be too that they don't perceive the need for more support, and, in view of the mother's involvement with the adolescent, feel content to let her carry the load. Future research should be directed at including the father's role in the diabetic management routine and further understand their needs for support.

Social Support and Diabetic Adjustment

Again it was expected that social support of the parents would have a beneficial effect on diabetic adjustment; more support, better diabetic adjustment. For both mothers and fathers, this expectation was substantiated for two sources of support, support from spouse and children. The more support from these two sources, the better the diabetic adjustment (as measured by attitudes to diabetes). On the other hand, the direction of the correlation between support from groups and diabetic adjustment

was such that the more support, the poorer the diabetic adjustment. Again, it seems likely that support received from belonging to special groups was used as a coping strategy when adolescents had poorer levels of diabetic adjustment.

Adolescents who are encouraged to develop a positive attitude about themselves and their illness, in all likelihood come from families who are close, expressive and supportive of individuality and autonomy. Also, it is most likely that those who are closest to the adolescent (ie. parents and siblings), will be more effective in influencing the adolescent's attitude and behavior in adhering to the complex diabetic regime (DiMatteo & Hays, 1981). The present findings suggest that a supportive environment, one with encouragement and support from both parents and siblings, provide a setting which may facilitate open discussion and expression of feelings without judgement, and can therefore influence the adolescent to adapt a more positive attitude to diabetes.

Although social support did influence diabetic adjustment, just how social support influences this remains unanswered. This study measured the mother's and father's perception of social support which, we are assuming, reflects the home environment. This may be quite different from the adolescent's perception. Future research will benefit from direct measures of the adolescent's perception of the family environment and their needs for social support.

As discussed in Chapter 3 there is no agreement in the literature as to how social support should be defined or measured. The Social Support Inventory was chosen in this study which measured the amount, source, and kind of social support. In addition to the amount, kind and source of support, both quality (Wilcox, 1981) and satisfaction of support (Leavy, 1983) have been identified as important factors in relation to social support. Although we know from this study who the important sources of support are, we didn't learn what type of assistance or help each source provided. More importantly, what is the quality of the support and how satisified are the parents with

these sources of support? Exploring these questions in future research may begin to enlighten us on the complexity of social support and its relationship to diabetic adjustment and metabolic control.

This study found that social support did not buffer the relationship between diabetic adjustment and metabolic control, thus there was no interaction effect. This could be due to weaknesses in the design of the study. The sample size was small (n=40) and may not have allowed for sufficient statistical power. In addition, low reliability and validity of support measures also reduces the probability of showing interaction effects (Cohen & Wills, 1985). The SSI is a new instrument. Although it has reported high reliability (.81), it has not been tested extensively. Also, this instrument is a global measure of social support. Instruments that measure support which provides a match, more relevant for the person facing the stressful event, are more appropriate for testing a buffering model (Cohen & Wills, 1985). In other words, there must be a match between the needs of the respondents and the kind of support which the instrument measures.

Adjustment to a chronic illness, is by definition, a continual process requiring continual adjustment and readjustment, a process that occurs over time. Longitudinal research designs are needed in order to answer some key issues in relation to social support. What stages occur in the process of adjustment to juvenile diabetes? Does the need for social support change over these stages? It is possible that as the course of the illness changes, the nature of the source, kind and amount of support will also change. An emphasis on this process for both parents and adolescent diabetics is needed.

Theoretical Implications

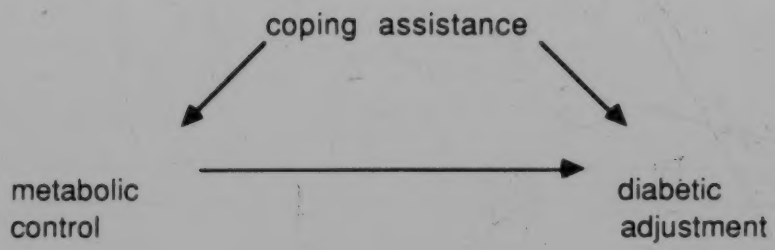
It was assumed in Figure 1 in Chapter 2 that the relationship between diabetic adjustment, metabolic control and the family environment was complex. No single conceptualization has succeeded in comprehensively describing the relationship

between these three variables. The results obtained in this study did not completely support the conceptual model, even though they substantiate the complexity of these relationships. These findings raise two important theoretical questions about the nature of the relationship between these three variables.

The first theoretical issue concerns the role of metabolic control as a dependent or independent variable in research on adolescent diabetes. A review of current literature reveals that metabolic control has been typically considered as a dependent variable. The rationale for this particular approach is evidenced by the notion that the achievement of a blood sugar level similar to that of the non-diabetic state is assumed to be associated with the eventual likelihood of developing future, irreversible complications. In other words, maintaining an acceptable or good level of metabolic control should help prevent these complications.

It has been demonstrated that acceptable levels of metabolic control during adolescence is particularly difficult to achieve. Puberty alone brings new emotional changes, including mood swings and the normal life stresses of adolescence which may influence the level of metabolic control (Hanson, Henggeler, & Burghen (1987 a). Other evidence points to the conclusion that psychological and biological factors have also been implicated as part of this difficulty. Recent studies (Leslie & Sperling, 1986) suggest that current treatments in insulin therapy cannot satisfactorily prevent or delay the development of potential microvascular complications. If these vascular complications are irreversible consequences, regardless of one's level of metabolic control, it seems plausible that efforts to achieve non-diabetic physiological levels of control should not be considered the most appropriate outcome of diabetic management. Therefore, consideration of metabolic control as a dependent variable in future research may not be particularly illuminating, and a new approach is in order. This new approach, as contrasted with the original model treats metabolic control as an independent variable and diabetic adjustment as the dependent variable (see Figure 4).

FIGURE 4 The New Theoretical Model



The new theoretical model (see Figure 4) suggests that diabetic adjustment is influenced by levels of metabolic control rather than vice versa. In terms of the stress literature, stressors lead to distress or, as represented in the original conceptual model of this thesis, diabetic adjustment leads to metabolic control (see Figure 1). The findings of the present study suggest that variable levels of metabolic control may in fact be the stressor which impacts on broader aspects of diabetic adjustment. Further, it may be that the support received may have been in response to the increased or poor levels of metabolic control. Therefore, in terms of the stress literature, metabolic control may now become the stressor which leads to distress (diabetic adjustment).

Metabolic control, although it is important, should not be considered the only, nor even the most, essential outcome of diabetic management. The recent advancement of having a simpler, long term objective measure of metabolic control, glycosylated hemoglobin ($HBA1_C$), has provided researchers with a more precise measure of metabolic control. Reliance on a physiological measure as an outcome of diabetes management is too narrow and restrictive.

There is some evidence to suggest that metabolic control alone is not the most important factor to consider in diabetic management. Kieren and Hurlbut (1988) conducted a total factor analysis of 16 individual and 13 family variables which represented various aspects of diabetic management. Eight factors were identified. Factor 1, individual diabetic adjustment accounted for 25.5 % of the variance. Interestingly, $HBA1_C$ was part of the sixth factor called "actual control" and accounted for 5.6% of the variance. A separate analysis of the individual variables, yielded five factors, but had similar results. Again factor 1, was individual diabetic adjustment which accounted for 27.4% of the variance. Factor 2 (called control) accounted for 16.5% of the variance. This factor comprised four items, of which $HBA1_C$ had the lowest factor score. In view of these findings, such a singular emphasis on metabolic control may be undesirable. Metabolic control may be only one indicator of how well the teen is managing various aspects of the illness.

Based on the above evidence, individual diabetic adjustment seems to play a major role in terms of diabetic management. There are multifaceted outcomes associated with diabetic adjustment, and, although more difficult to measure, future research should focus on these broader aspects. For example asking questions in relation to nutrition, recreation, compliance with the diabetic management routine, health services utilization, perceived metabolic control, and satisfaction with diabetic management routine are but a few examples which may be viewed as broader aspects of diabetic adjustment.

An examination of these and other variables as outcome measures may help in learning more about the process of diabetic adjustment. This new approach, rather than an emphasis on metabolic control as in past research, may provide new insight into diabetes research. Diabetes is a chronic illness which by definition, extends over a long period of time. Major research efforts should focus on the adjustment to diabetes and on dealing with the management of the distress caused by it. According to Holroyd and

Lazarus (1982) the way in which an individual reacts to the demands of a chronic illness can be important contributors to the course of an illness.

Adjustment to diabetes is a continual process. Longitudinal studies are needed to document this continual adjustment process as it evolves and changes, and, as the individual strives to evaluate, adjust and re-adjust to diabetes.

The second major theoretical implication is clarifying the role of social support in relation to diabetic adjustment and metabolic control. In the adult stress literature, chronic strains (chronic illness) have been defined as persistent objective conditions that require continual readjustment (Pearlin, Lieberman, Menaghan, & Mullan, 1981). Daily living with juvenile diabetes and its management can represent a constant chronic strain. Given the confusion surrounding social support and its integral association with coping, social support may be viewed as part of the coping process in living with a chronic strain (Thoits, 1986). She suggests that these two concepts be integrated into one, "coping assistance" which she defined as "active participation of significant others in an individual's stress management efforts" (p. 417). The present findings suggest (based on the writer's interpretation of the findings) that the social support received may have been in response to, or a consequence of, a less than ideal level of metabolic control, and thus may represent some form of the coping process.

As shown in Figure 4, coping assistance could be studied in relation to both diabetic adjustment and metabolic control. It is tempting to infer that in general, metabolic control influences diabetic adjustment and coping assistance in turn influences both diabetic adjustment and metabolic control. However, it is likely that the relationships between these variables are bi-directional. Testing this new model would require longitudinal research designs. Examining the role of coping assistance may be a more enlightening direction in research on adolescent diabetes and their families.

Diabetic adjustment can be viewed as a chronic strain, to which one must continually adapt and adjust. There is very little research on how adolescents and

parents cope with diabetes. Future research may benefit from the development of a diabetes specific chronic strain instrument to measure this construct. This could be used to explore how both parents and adolescents cope with this chronic strain.

Methodological Issues

This study raises several methodological issues. The first measurement issue concerns the use of the SSI, a new instrument which has not yet been extensively used. The normative group scores on the SSI were based on a sample of 118 parents attending a parent education program for pre-school children. Because the samples were so different, it was deemed inappropriate to compare the present results with those on the original sample. Furthermore, it was the purpose of this study to elucidate the pattern of social support for the parents of this group of adolescents. With increased use of the instrument, the developers should receive more scores from varied groups, thus comparison may then seem more appropriate.

This study failed to identify a statistically significant relationship between social support and metabolic control which influenced metabolic control in the direction posited. Perhaps the SSI did not adequately assess this dimension of parental support or, it may be that social support is more important in the day to day management and adjustment areas of the disease. The data in this study seem to support the latter. Since the number of the SSI items initially evaluated in relation to HbA1c and diabetic adjustment was large, it was possible that some of the relationships observed in this study were attributed to chance. However, in the case of the ten indices to measure social support, the relationship to metabolic control and diabetic adjustment reached a fairly stringent criterion for statistical significance. Larger sample sizes are required to validate these findings.

One further issue with regards to this instrument needs mentioning. The SSI identified five kinds of social support (emotional, esteem, network, appraisal and

altruistic) as defined in Chapter 1. In the present study, both mothers and fathers received more altruistic support than the four other kinds of support (see Tables 5 and 6). This parallels the findings of Deby (1986) and was also true for the sample used in the development of this scale. Also in the present study, all of the eleven sources of support (with three exceptions) provided greater amounts of altruistic support than the other four kinds of support (see Tables 5 and 6). These three exceptions were faith and media for mothers and media for fathers. If, in the present study, one disregards altruistic support, the pattern of support received is quite different. For example, for mothers, the greatest kind of support received from spouse and children was emotional support (see Table 5). The greatest kind of support received from relatives, friends, co-workers, church, community, and belonging to special groups was esteem support. Professionals provided the most amount of network support; and faith provided the most amount of appraisal support. It may be that those wanting to give more socially desirable responses may have been more inclined to categorize the amount of altruistic support received as "yes a lot". The resulting findings would then favor altruistic support as the highest amount of support received.

These descriptive findings raise some important questions regarding altruistic support on the instrument and bear further investigation. More specifically, the first four definitions of emotional, esteem, network, and appraisal support seem to be more concrete, whereas the definition of altruistic support (I feel good by helping others) is a more global, abstract concept. Furthermore, doesn't everyone feel good when they help others? Also it seems possible that altruistic support may contribute to self-esteem support thus confounding the results. For example, If I help someone, I feel good (altruistic support) In turn, the person I help will probably value and respect me for what I've done (self-esteem support).

The second measurement concern was the use of the FSS as an indicator of the qualities of the family environment. Responses on this scale were not significantly

related to either diabetic adjustment or metabolic control. One possible explanation for this may be that the FSS was not an appropriate measure of the family environment as it did not tap key issues or strengths for diabetic families. MOOS Family Environment Scale, which assesses the social environment of families along three dimensions of family life (relationships, values for personal growth and the basic structure or system of the family), has been used in other studies with diabetic adolescents (Anderson, Miller, Auslander, & Santiago, 1981; Shouval, Ber, & Galatzer, 1982). Both studies have found different patterns of perceived family environment for adolescent diabetics who were in good metabolic control and adhered to the diabetic management regime. Thus, MOOS Family Environment Scale may be more illuminating on the family environment of families with a chronic illness.

Most research on the parents of adolescent diabetics have examined only the mother's perspective on the relationship between family environment variables, and level of adjustment and metabolic control. Although this study brings new information to the literature by including the father's perspective, there still remains the question of how to tap the family environment using a family or couple score that combines more than one member's perspective.

Limitations of the Study

Before conclusions from this study can be drawn, limitations of the should be mentioned. First, the results are based on a modest, non-random sample (n=40) of diabetic families. Generalizability of findings is therefore limited to only this sample. It should be noted, however, that this sample fairly well resembles other samples of diabetic adolescents (Ahfield, Soler, & Marcus, 1983; Hanson, Henngler, & Burghen, 1987 a; Waller et al. 1986).

Several issues are raised by this study concerning the relationship between diabetic adjustment and metabolic control. The first issue concerns causality. It is tempting to

infer that diabetic adjustment leads to metabolic control, which is what the original conceptual model depicted. However as in any correlational study such as this one, there are important threats to internal validity. One of these is reciprocal causation. It is quite possible that the association between diabetic adjustment and metabolic control may be reciprocal in nature. It is possible that diabetic adjustment (as measured by attitude to diabetes) can lead to good metabolic control. Correspondingly, a poor level of metabolic control may also contribute to a negative attitude. Although several studies suggest that good adjustment is associated with better metabolic control, it is not yet clear which variable influences the other. Because this study was correlational in nature, the findings can say very little about the nature or direction of causality between these two variables. While this can be tested statistically, it was beyond the scope of this project to do so. Separating out causal influences between diabetic adjustment and metabolic control requires well controlled longitudinal designs that study diabetic children and their families from diagnosis.

Second this is a cross sectional study rather than a longitudinal study. This places restrictions on determining the effects of diabetic adjustment and social support on metabolic control on individuals over time.

Implications for Diabetes Educators

First and foremost, it is imperative that diabetes educators have a broad understanding of the issues, the kinds of problems and outcomes associated with diabetes management that diabetic adolescents and parents must confront. The findings of this study suggest that professionals working with adolescent diabetics should focus more on attitudes to diabetes. Most diabetes programs tend to emphasize knowledge and the technical aspects of diabetes education and forget the role of psychosocial variables that may well influence attitudes toward diabetes.

A positive family environment should prevail in families with diabetic adolescents. One of the goals of diabetes educators should be to assist the parents in creating and maintaining such an environment. In addition to assisting the parents to develop good coping strategies, professionals should help the parents identify not only their own personal resource system, but also the informal and formal network of possible support. However, diabetes educators are reminded that simply advocating a certain coping style or suggesting what sources of support may be most helpful in dealing with the chronic strain of diabetes, may not be useful as the social and psychological characteristics will vary of the people involved.

This study indicates that there are differences between mothers and fathers in their requirements for social support. Programs that are flexible and responsive to the needs of the father in particular, need to be designed and implemented. Parents are continually responsible for their child's health. Increasing the parent's confidence and assisting them in adjusting to the necessary diabetic management routine should be an important consideration for all professionals working with diabetic adolescents and their families.

Conclusion

This study demonstrates that the relationship between diabetic adjustment, metabolic control and qualities of the family environment is not simple, but indeed very complex. One element of the family environment, social support, has an effect on these families in coping with the chronic strain of diabetes. In addition, supportive relationships with one's spouse and children is beneficial in helping the teen adjust to diabetes. Researchers and professionals need to continually examine and consider the complexities of the family environment, and its influence on adjustment to and control of diabetes in adolescent diabetics.

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APPENDIX A

<DATE>

<INSIDE ADDRESS>

Dear <NAME>

Your family has been suggested as possible participants in the "Family and Diabetes Project", a research study about how families with adolescent children handle everyday family problem solving. All families are involved in problem solving to handle daily issues and this is especially true for families with children with a chronic illness like diabetes. We are interested in learning about the different ways families function when they have to deal with problem situations.

The families in this study need to have these characteristics:

The family unit has been living together for at least 1 year.
The teenager has been diagnosed as having diabetes at least 1 year.
No other family member has a chronic illness.
Diabetic teenager is between ages of 13 and 18.

The project will involve one two-and-a-half hour meeting with the father, mother and diabetic teenager. Activities will consist of completing questionnaires and participating in several videotaped problem solving situations. We also request that the teenager in the family have a non-fasting blood test at the University hospital, at our expense. Participation is completely voluntary, and the family can with draw at any time. At the end of the project we will pay you $25 as a token of our appreciation.

Our research assistants will be contacting you soon to answer any questions and see if your family can participate. Thank you for your consideration of this very important research.

Sincerely,

Dianne K. Kieren, Ph. D.
Professor
Department of Family Studies
Studies
Faculty of Home Economics
Phone: 432-5770
434-0081 (evenings)

Nancy L. Hurlbut, Ph. D.
Assistant Professor
Department of Family

Faculty of Home Economics

Research Assistants on the Project: Tricia Looney, Jean Lusk, Barb Mahaffey

TELEPHONE CHECKLIST

1. Family name: _____
2. Introductory letter received? Yes _____ No _____
3. Do they have a diabetic adolescent aged 13-18?

   Yes _____ No _____
4. Gender of diabetic teen: Female _____ Male _____

   Name of teen: _____
5. Does anyone else in the family have a chronic illness?

   Yes _____ No _____
6. Has the family been living together at least one year?

   Yes _____ No _____
7. Willing to participate? Yes _____ No _____
8. Wants Dianne to call? Yes _____ No _____
9. Meeting scheduled? Yes _____ No _____

   If no, call back time and date: _____

APPENDIX B

INFORMED CONSENT FORM

The purpose of this project is to study how families with a diabetic teenager solve family problems. Both parents and the diabetic teenager in your family will be asked to complete several questionnaires and to participate in several problem solving situations while being videotaped. The study will require all three family members to attend one 2 1/2 hour session or two one-hour sessions at the university; also, the teen will be asked to have a non-fasting blood test at the university hospital. There is no risk in any of these tasks, and you may withdraw from the project at any time. The identities of families will be protected, and you will not be identified in any way. At the completion of the project your family will receive a cheque for $25 as a token of appreciation. Copies of the results will be available to you upon request.

Signature of Participant _____

Date _____

APPENDIX C

<DATE>

<INSIDE ADDRESS>

Dear <NAME>

We wish to thank you for contributing to the study of Family and Diabetes. We realize that it is difficult to give up precious family time together for this purpose. We hope that you have found it to to be an interesting experience.

Over the summer and fall we will be completing the data collection process and analyzing the data. Although our final report to the funding agency isn't due until June 1988 we will send you a preliminary summary in January 1988 if you wish. If you requested a copy of the results, you can expect to receive it at that time. If you have any questions please feel free to contact either of us at any time.

Sincerely,

Dianne K. Kieren, Ph. D.
Professor
Department of Family Studies

Nancy Hurlbut, Ph. D
Assistant Professor
Department of Family Studies

Please send us a copy of the results of this study. We would like it sent to:

_____

_____

_____

_____

APPENDIX D

Table D 1 Factor Loadings of Friends and Relatives Composite Index (Mothers)

Variable	Factor Loading
emotional support from friends	.44055
esteem support from friends	.44845
network support from friends	.44019
appraisal support from friends	.26079
altruistic support from friends	.28212
network support from relatives	.32611

Table D 2 Factor Loadings of Groups Composite Index (Mothers)

Variable	Factor Loading
emotional support from groups	.73517
esteem support from groups	.78964
network support from groups	.87728
appraisal support from groups	.31567
altruistic support from groups	.64272
esteem support from community	.63591
network support from community	.59161

Table D 3 Factor Loadings of Altruistic Composite Index (Mothers)

Variable	Factor Loading
altruistic support from spouse	.89554
altruistic support from children	.89554
altruistic support from beliefs	.36870
altruistic support from media	.39820

Table D 4 Factor Loadings of Religion Composite Index (Fathers)

Variable	Factor Loading
altruistic support from church	.79547
network support from beliefs	.79547

APPENDIX E

Table E 1

Zero Order Correlations Between Family Strengths and Metabolic Control ($HbA1_c$)

Family Strengths	$HbA1_c$
Mothers' Scores	
Total Scale	.1249
pride	.1811
accord	.0288
Fathers' Scores	
Total Scale	.0412
pride	.1789
accord	.1384

APPENDIX F

Table F 1 Factor Loadings of Composite Index: Spouse (Mothers)

Variable	Factor Loading
emotional support from spouse	.36017
esteem support from spouse	.46491
network support from spouse	.43587
appraisal support from spouse	.27333

Table F 2 Factor Loadings of Composite Index: Children (Mothers)

Variable	Factor Loading
emotional support from children	.14199
esteem support from children	.34959
network support from children	.44640
appraisal support from children	.16647

Table F 3 Factor Loadings of Composite Index: Groups (Fathers)

Variable	Factor Loading
emotional support from groups	.76378
esteem support from groups	.90735
network support from groups	.93547
appraisal support from groups	.80340
altruistic support from groups	.67098

APPENDIX G

Table G1

Zero Order Correlations Between Family Strengths and Diabetic Adjustment

Family Strengths	Type of Diabetic Adjustment					
	Independence	School	Family	Peer	Attitude	Total
Mothers' scores						
total	-.1415	-.2606	-.2226	-.0737	-.2393	-.2333
pride	-.1379	-.2384	-.1643	.0094	-.1278	-.1525
accord	.0562	.1242	.1579	.1366	.2344	.1925
Fathers' scores						
total	-.1493	-.2004	-.0647	-.0783	-.0525	-.1216
pride	-.0631	-.1216	-.0509	-.0672	.0840	-.0352
accord	.1735	.1902	.0479	.0516	.1835	.1600

APPENDIX H

Table H 1

Summary of Multiple Regression Analysis on the Effects of Social Support on the Relationship Between Diabetic Adjustment and Metabolic Control

Interaction Term	t statistic	p value
Mothers' variables		
spouse x d. a.	-.8190	.4181
children x d. a.	-.6122	.5442
friends/relatives x d. a.	.7911	.4340
groups x d. a.	-.6518	.5186
altruism x d. a.	-1.1769	.2470
Fathers' variables		
religion x d. a.	-.6147	.5426
media x d. a.	.3550	.7247
altruistic support spouse x d. a.	.3302	.7432
emotional support children x d. a.	-.3107	.7578
groups x d. a.	-1.6041	.1174

Note. d. a. = diabetic adjustment

APPENDIX I

Please rate the following statements by circling the number which best expresses your feelings. There are no right or wrong answers. Please answer honestly, according to the way you feel right now.

1 Never	2 Once in a While	3 Sometimes	4 Most of the Time	5 Always

1.	I think diabetes is a serious illness.	1	2	3	4	5
2.	I control my diabetes myself.	1	2	3	4	5
3.	I tell my teachers I have diabetes.	1	2	3	4	5
4.	I think I have too many dents and bumps on my body.	1	2	3	4	5
5.	I talk to my nondiabetic friends about diabetes.	1	2	3	4	5
6.	My brothers and sisters tease me about having diabetes.	1	2	3	4	5
7.	I think my diabetes is getting worse.	1	2	3	4	5
8.	I wish I were more independent.	1	2	3	4	5
9.	I think I would enjoy school more if I didn't have diabetes.	1	2	3	4	5
10.	I try to cover up the bumpy areas on my body with my clothes.	1	2	3	4	5
11.	I tell my friends that I have diabetes.	1	2	3	4	5
12.	I think my parents are more concerned about my diabetes than about me.	1	2	3	4	5
13.	I get embarassed when I have to refuse food.	1	2	3	4	5
14.	I wish I could run away.	1	2	3	4	5
15.	I have to go to the bathroom more than the other students at school.	1	2	3	4	5
16.	I think I'm as good looking as most other kids.	1	2	3	4	5

17. My friends deliberately tempt me to eat foods I shouldn't eat.	1	2	3	4	5
18. My parents expect too much of me.	1	2	3	4	5
19. I would rather eat something I shouldn't rather than tell people I have diabetes.	1	2	3	4	5
20. I would rather have my parents control my diabetes for me.	1	2	3	4	5
21. I daydream at school.	1	2	3	4	5
22. I wish I looked different than I do.	1	2	3	4	5
23. I enjoy eating with my friends.	1	2	3	4	5
24. I feel like no one pays attention to me at home.	1	2	3	4	5
25. I think people with diabetes shouldn't get married.	1	2	3	4	5
26. My parents act like diabetes is THEIR disease, not MINE.	1	2	3	4	5
27. School work is easy for me.	1	2	3	4	5
28. I have trouble sleeping.	1	2	3	4	5
29. My nondiabetic friends understand me.	1	2	3	4	5
30. My parents embarass me.	1	2	3	4	5
31. I get mad at myself when I have insulin reactions.	1	2	3	4	5
32. My mother is too careful or protective of me.	1	2	3	4	5
33. I have fun at school.	1	2	3	4	5
34. I feel tired.	1	2	3	4	5
35. My friends tease me about my diabetes.	1	2	3	4	5
36. I feel like my parents punish me too much.	1	2	3	4	5
37. I would rather not tell people when I'm having a reaction.	1	2	3	4	5

38. My father is too careful or protective of me.	1	2	3	4	5
39. I do well in school.	1	2	3	4	5
40. I have too many insulin reactions.	1	2	3	4	5
41. I think my nondiabetic friends would like me better if I didn't have diabetes.	1	2	3	4	5
42. I talk to my parents about my diabetes.	1	2	3	4	5
43. I wish I didn't have diabetes.	1	2	3	4	5
44. People who have diabetes get too much responsibilities before they are ready for them.	1	2	3	4	5
45. I have fights with the other kids in school.	1	2	3	4	5
46. I feel like I'm not hungry.	1	2	3	4	5
47. It's hard to make friends when you have diabetes.	1	2	3	4	5
48. My parents act like they love me.	1	2	3	4	5
49. I fake my urine test reports.	1	2	3	4	5
50. I take part in figuring out my own meals.	1	2	3	4	5
51. I get discouraged in school.	1	2	3	4	5
52. I feel like I'm in control as far as my diabetes is concerned.	1	2	3	4	5
53. I wish I had more friends.	1	2	3	4	5
54. I get angry at my mother.	1	2	3	4	5
55. I feel like not taking my insulin.	1	2	3	4	5
56. I give myself my own insulin.	1	2	3	4	5
57. I wish my teachers knew more about diabetes.	1	2	3	4	5

58. I'm afraid I'll get very sick before I'm very old.	1	2	3	4	5
59. I go around with kids who are younger than me.	1	2	3	4	5
60. I get angry at my father.	1	2	3	4	5
61. When I'm angry, I forget to take my insulin.	1	2	3	4	5
62. On sick days when I have a cold or the flu, I manage my diabetes myself.	1	2	3	4	5
63. I get in trouble in school.	1	2	3	4	5
64. I tell people when I think I'm having a reaction.	1	2	3	4	5
65. Other kids pick on me.	1	2	3	4	5
66. I wish my family knew more about diabetes.	1	2	3	4	5
67. When I'm mad, I eat more than usual.	1	2	3	4	5
68. I wish I wasn't fat.	1	2	3	4	5

Please rate the following statements as they apply to your family. Use these choices, and circle the appropriate number.

1 Strongly Disagree	2 Moderately Disagree	3 Neither Agree Nor Disagree	4 Moderately Agree	5 Strongly Agree

1.	We can express our feelings.	1	2	3	4	5
2.	We tend to worry about many things.	1	2	3	4	5
3.	We really do trust and confide in each other.	1	2	3	4	5
4.	We have the same problems over and over.	1	2	3	4	5
5.	Family members feel loyal to the family.	1	2	3	4	5
6.	Accomplishing what we want to do seems difficult for us.	1	2	3	4	5
7.	We are critical of each other.	1	2	3	4	5
8.	We share similar values and beliefs as a family.	1	2	3	4	5
9.	Things work out well for us as as a family.	1	2	3	4	5
10.	Family members respect one another.	1	2	3	4	5
11.	There are many conflicts in our family.	1	2	3	4	5
12.	We are proud of our family.	1	2	3	4	5
13.	Our family functions well.	1	2	3	4	5

Please read each statement and then indicate how much support you receive from each of the sources listed by marking: NO, YES, or YES A LOT.

1. I have a feeling of being loved or cared about from:

My spouse or partner	NO	YES	YES A LOT
My children	NO	YES	YES A LOT
Other relatives	NO	YES	YES A LOT
Close friends	NO	YES	YES A LOT
Co-workers	NO	YES	YES A LOT
Church/Synagogue groups	NO	YES	YES A LOT
My spiritual faith	NO	YES	YES A LOT
Community or neighborhood groups	NO	YES	YES A LOT
Professionals or service providers	NO	YES	YES A LOT
Special groups I belong to	NO	YES	YES A LOT
Reading certain books or watching T.V.	NO	YES	YES A LOT

2. I feel I am valued or respected for who I am and what I an do by:

My spouse or partner	NO	YES	YES A LOT
My children	NO	YES	YES A LOT
Other relatives	NO	YES	YES A LOT
Close friends	NO	YES	YES A LOT
Co-workers		NO	YES
YES A LOT			
Church/Synagogue groups	NO	YES	YES A LOT
My spiritual faith	NO	YES	YES A LOT
Community or neighborhood groups	NO	YES	YES A LOT
Professionals or service providers	NO	YES	YES A LOT
Special groups I belong to	NO	YES	YES A LOT
Reading certain books or watching T.V.	NO	YES	YES A LOT

3. I have a sense of trust or security from the "give and take" of being involved with:

My spouse or partner	NO	YES	YES A LOT
My children	NO	YES	YES A LOT
Other relatives	NO	YES	YES A LOT
Close friends	NO	YES	YES A LOT
Co-workers	NO	YES	YES A LOT
Church/Synagogue groups	NO	YES	YES A LOT
My spiritual faith	NO	YES	YES A LOT
Community or neighborhood groups	NO	YES	YES A LOT
Professionals or service providers	NO	YES	YES A LOT
Special groups I belong to	NO	YES	YES A LOT
Reading certain books or watching T.V.	NO	YES	YES A LOT

4. When I need to talk or think about how I'm doing with my life, I feel understood and get help from:

My spouse or partner	NO	YES	YES A LOT
My children	NO	YES	YES A LOT
Other relatives	NO	YES	YES A LOT
Close friends	NO	YES	YES A LOT
Co-workers	NO	YES	YES A LOT
Church/Synagogue groups	NO	YES	YES A LOT
My spiritual faith	NO	YES	YES A LOT
Community or neighborhood groups	NO	YES	YES A LOT
Professionals or service providers	NO	YES	YES A LOT
Special groups I belong to	NO	YES	YES A LOT
Reading certain books or watching T.V.	NO	YES	YES A LOT

5. I feel good about myself when I am able to do things for and help:

My spouse or partner	NO	YES	YES A LOT
My children	NO	YES	YES A LOT
Other relatives	NO	YES	YES A LOT
Close friends	NO	YES	YES A LOT
Co-workers	NO	YES	YES A LOT
Church/Synagogue groups	NO	YES	YES A LOT
My spiritual faith	NO	YES	YES A LOT
Community or neighborhood groups	NO	YES	YES A LOT
Professionals or service providers	NO	YES	YES A LOT
Special groups I belong to	NO	YES	YES A LOT
Reading certain books or watching T.V.	NO	YES	YES A LOT